



**REPORT OF THE
COMPTROLLER AND AUDITOR GENERAL
OF INDIA**

FOR THE YEAR ENDED 31 MARCH 1988

No. 3 of 1989

**UNION GOVERNMENT
(DEFENCE SERVICES - AIR FORCE AND NAVY)**

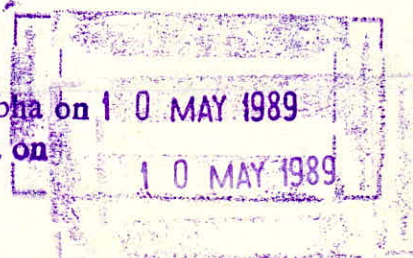
**REPORT OF THE
COMPTROLLER AND AUDITOR GENERAL
OF INDIA**

FOR THE YEAR ENDED 31 MARCH 1988

No. 3 of 1989

**UNION GOVERNMENT
(DEFENCE SERVICES - AIR FORCE AND NAVY)**

Presented in Lok Sabha on 10 MAY 1989
Laid in Rajya Sabha on



THE UNIVERSITY OF CHICAGO

COMMITTEE ON THE HISTORY OF THE UNIVERSITY OF CHICAGO

TABLE OF CONTENTS

	PARAGRAPH	PAGE
Prefatory Remarks		iv
Overview		v
CHAPTER I		
General	1	1
CHAPTER II MINISTRY OF DEFENCE		
Payment of commission to Indian agents	2	2
Hiring of accommodation	3	4
CHAPTER III AIR FORCE		
Reviews		
Air transport facilities for VVIPs and VIPs	4	5
Medium tactical transport aircraft	5	10
Procurement, manufacture, operation and maintenance of an aircraft	6	14
Development and operation of a computerised inventory control system at an equipment depot	7	19
Training		
Procurement of unsuitable gliders	8	24
Procurement of a training simulator	9	25
Delay in development and fabrication of aircraft simulators	10	27
Development of a trainer aircraft	11	29
Flight Safety		
Installation of an air traffic surveillance radar	12	30
Procurement of navigation equipment for VVIP flights	13	31
Procurement and installation of a radar system	14	33
Procurement and utilisation of mechanical runway sweepers	15	34
Provisioning		
Infructuous expenditure on procurement of parachute assembly	16	35
Extra expenditure in procurement of an equipment	17	36
Infructuous expenditure due to over-provisioning of brake parachute	18	37

	PARAGRAPH	PAGE
Other cases		
Heavy accumulation of cotton and woollen uniforms	19	38
Avoidable payment of interest in acquisition of land	20	38
Non-establishment of indigenous overhaul facilities	21	40
Delay in procurement of a weapon system	22	41

CHAPTER IV NAVY

Reviews		
Training establishment	23	45
Establishment of a communication station	24	50
Delay in setting up of training facilities	25	53
Training		
Non-installation of training equipment	26	55
Works Services		
Setting up of an armament depot	27	56
Unauthorised construction of married accommodation.	28	57
Procurement of unsuitable steel bars	29	58
Procurement of spares for power generating equipment	30	58
Procurement of a crane for a wharf	31	59
Provisioning		
Over provisioning of synthetic resin	32	60
Procurement of Hospital equipment	33	60
Procurement of life expired paint	34	61
Procurement of equipment for Antarctica expedition	35	62
Procurement of defective stores	36	62
Avoidable expenditure due to delay in acceptance of tender	37	63
Other cases		
Modification of plotting tables on certain ships	38	64
Procurement and utilisation of heavy duty tractors	39	65
Loss due to delay in raising discrepancy reports	40	66
Construction of patrol vessels	41	67
Import of Data Bus for certain ships	42	69
Uneconomic indigenous production of a rocket	43	71
Payment of demurrage charges	44	72
Selection of defective engines	45	73

CHAPTER V
RESEARCH AND DEVELOPMENT ORGANISATION

	PARAGRAPH	PAGE
Air Force		
Review on the design and development of an inter-services pilotless target aircraft	46	75
Development of an airborne communication equipment	47	78
Development of a missile target	48	80
Navy		
Review on the working of Naval Research and Development laboratories	49	82
Aeronautical Development Agency		
Review on the Light Combat Aircraft project	50	91

in article

operation and maintenance of

facilities, maintenance, and

operation

program

and

for

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

operation, wherever considered necessary

and approved by the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and the Board of Directors

and

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

the

(1) First Corps Airborne

(2) Second Corps Airborne

(3) Third Corps Airborne

(4) Fourth Corps Airborne

(5) Fifth Corps Airborne

(6) Sixth Corps Airborne

(7) Seventh Corps Airborne

(8) Eighth Corps Airborne

(9) Ninth Corps Airborne

(10) Tenth Corps Airborne

(11) Eleventh Corps Airborne

(12) Twelfth Corps Airborne

(13) Thirteenth Corps Airborne

(14) Fourteenth Corps Airborne

(15) Fifteenth Corps Airborne

(16) Sixteenth Corps Airborne

(17) Seventeenth Corps Airborne

(18) Eighteenth Corps Airborne

(19) Nineteenth Corps Airborne

(20) Twentieth Corps Airborne

PREFATORY REMARKS

The results of audit in respect of the financial transactions of the Air Force and the Navy were hitherto incorporated in the Report of the Comptroller and Auditor General of India, Union Government (Defence Services). There has been a growth in the extent of audit of the Air Force and the Navy based on the sizeable investments, volume of financial transactions and the increased activities of the Services. A beginning has, therefore, been made to present a separate Audit Report for the Air Force and the Navy. This Report for the year ended 31 March 1988 has been prepared for submission to the President under Article 151 of the Constitution.

2. The Report includes the following reviews:

- (a) Air transport facilities for VVIPs and VIPs
- (b) Medium tactical transport aircraft
- (c) Procurement, manufacture, operation and maintenance of an aircraft

- (d) Development and operation of a computerised inventory control system at an equipment depot
- (e) Naval training establishment
- (f) Establishment of a communication station
- (g) Delay in setting up of training facilities
- (h) Design and development of an inter-services pilotless target aircraft
- (i) Working of Naval Research and Development laboratories
- (j) Light Combat Aircraft project

3. The cases mentioned in the Report are among those which came to notice in the course of test audit during the year 1987-88 as well as those which had come to notice in earlier years but could not be dealt with in previous years; matters relating to the period subsequent to 1987-88 have also been included, wherever considered necessary.

The first part of the document
 discusses the general principles
 of the proposed system.
 It is intended to provide a
 clear and concise overview
 of the main objectives and
 the scope of the project.

The second part of the document
 details the specific components
 and the implementation strategy.
 This section includes a
 thorough analysis of the
 technical requirements and
 the resources needed for
 the successful execution of
 the project.

The third part of the document
 outlines the expected outcomes
 and the evaluation criteria.
 It aims to establish a
 framework for measuring
 the effectiveness and impact
 of the proposed system.

- (1) The first objective is to
- (2) The second objective is to
- (3) The third objective is to
- (4) The fourth objective is to
- (5) The fifth objective is to
- (6) The sixth objective is to
- (7) The seventh objective is to
- (8) The eighth objective is to
- (9) The ninth objective is to
- (10) The tenth objective is to

OVERVIEW

The Audit Report for the year ended 31st March 1988 contains 50 paragraphs including 10 reviews. The points highlighted in the Report are summarised below.

I. Payment of commission to Indian agents

In September 1977, guidelines were issued by the Ministry of Defence to regulate the payment of agency commission in the purchase of arms, ammunition and equipment. A review of the implementation of the orders revealed that the guidelines were not enforced in respect of purchases made for Ministry of Defence through Departments of other Ministries. The violation of its own guidelines resulted in the Ministry making an avoidable payment of Rs.62.21 lakhs as agency commission in contracts reviewed in Audit.

(Paragraph 2)

II. Air Transport facilities for VVIPs and VIPs

A review of procurement, utilisation and maintenance of aircraft with a communication squadron, which provides air transportation to VVIPs and VIPs, revealed financial irregularities, uneconomic use of aircraft and violation of rules and procedures.

Delay in the procurement of Boeing 737 aircraft resulted in hiring of aircraft and payment of lease charges amounting to Rs.13.85 crores. The continued leasing of aircraft even after the induction of Boeing 737 aircraft led to payment of Rs.1.81 crores. The premature withdrawal of certain MI-8 helicopters and their replacement by similar aircraft led to avoidable expenditure. The selection and procurement of an aircraft of a larger capacity *vis-a-vis* the actual requirement proved uneconomical. There was high incidence of empty flying, resulting in an avoidable loss of Rs.8.70 crores. Besides,

the flying hours utilised on training of pilots were abnormally in excess of accepted norms. The cost on this account was Rs.2.26 crores.

Relatives and friends accompanied VVIPs and VIPs as officials on several occasions in contravention of rules. The rates for official and un-official travels have not been revised in line with increases in costs. The results of the review point to the need for comprehensively evaluating the cost effectiveness of the services provided by the squadron as well as for ensuring that the essentially sound rules and procedures are adhered to scrupulously.

(Paragraph 4)

III. Medium tactical transport aircraft

The urgent need of the Air Force to identify and induct a suitable medium tactical transport aircraft (METAC) was recognised in 1965. After considering various options, it was decided in 1972 to induct the HS 748 for the METAC role. This was later found to be unsuitable. Subsequently, in 1984, another aircraft (AN-32) was imported. A review of the selection and procurement of the medium tactical transport aircraft revealed inadequate planning arrangements for its timely and cost effective induction. The HS-748 aircraft was allocated to the Army and the Air Force even though both Services had emphasised that it did not meet their requirements. This resulted in a largely infructuous investment of Rs.76.87 crores. The delay in the selection of the aircraft led to the sub-optimal utilisation of heavy transport aircraft in the METAC role. There were problems with the timely ordering of AN-32 aircraft and in not exercising option clauses advantageously. There was also evidence of a mismatch between the induction of the aircraft and the creation of maintenance support facilities.

(Paragraph 5)

IV. Review on the procurement, manufacture, operation and maintenance of an aircraft

An aircraft, imported in 1976, was inducted in 1977. Its licence manufacture was undertaken by Hindustan Aeronautics Limited alongwith the repair and overhaul of the aircraft and associated equipment. The review revealed poor planning, project management, implementation and monitoring. The basic economic and physical targets set were not realised satisfactorily. Due to lack of adequate planning, the project for manufacture of the aircraft had to be foreclosed. Besides, the reliability of the aircraft produced indigenously was poor resulting in premature servicing at an avoidable cost of Rs.30.44 lakhs. The repair and overhaul facilities for aero-engines could not be established due to poor planning. The work was, consequently, offloaded to foreign manufacturers at a cost of Rs.45.68 crores. Non-availability of sufficient aero-engines makes the full exploitation of the aircraft doubtful. Further, maintenance backing for the aircraft was also uncertain with inadequate indigenous repair and overhaul facilities.

(Paragraph 6)

V. Development and operation of a computerised inventory control system at an equipment depot

Based on a feasibility study in 1978 to computerise the inventory control system at an equipment depot, an electronic data processing (EDP) system, costing Rs.45 lakhs in foreign exchange was acquired and commissioned in 1983. It was, however, made operational in 1985. The acquisition of the system revealed planning infirmities such as the absence of an EDP strategic plan and lack of clearly defined objectives. These contributed to delays in systems analysis and design. Although the feasibility study recommended an EDP system manufactured by a public sector undertaking, an entirely different system was imported which was not

compatible with the existing system at Air HQ. A manual system has been run in parallel with the computerised system for over three years thereby affecting the economics of the project. Finally, costs, benefits and experience have not been evaluated.

(Paragraph 7)

VI. Procurement of a training simulator

Four foreign firms responded to a global tender for an air combat simulator in 1984. A technical committee found the offers of firms 'A' and 'D' technically inadequate. This notwithstanding, firm 'A' was invited subsequently alongwith firms 'B' and 'C' for technical and commercial discussions. The simulators offered by the three firms were not physically evaluated even though this was considered necessary. Although the offers of firms 'A' and 'C' were rejected in favour of firm 'B' whose offer was found acceptable on techno-economic considerations, the contract was finally concluded in 1987 with firm 'A' based on its reduced offer of Rs.12.43 crores. There was evidence of defective procurement procedures having been employed in the acquisition of a crucial, technology intensive training equipment.

(Paragraph 9)

VII. Development of a trainer aircraft

An existing jet trainer aircraft (Kiran) was required to be developed by incorporating a modified indigenous engine for use as a modern basic jet trainer as well as for limited support and counter insurgency purposes. The project was sanctioned in 1975 at a cost of Rs.2.08 crores revised to Rs.6.65 crores in 1984. The prototype developed fell materially short of specified parameters. Consequently, the aircraft could not be used for its intended role and the Air Force reduced the total number of aircraft ordered. Development work was closed in 1984. Anticipated savings of Rs.5.50 crores had to be foregone in view of the time overrun.

(Paragraph 11)

VIII. Procurement of navigation equipment for VVIP flights

The procurement of 10 sets of portable navigational equipment for the safe operation of VVIP flights at remote helipads was sanctioned in 1979. The requirement was later increased to 68 sets. Though global tenders were invited, orders were not placed due to non-compatibility of the equipment's size with the helicopter. Subsequently, after a five year delay, 20 sets of the same equipment offered by a firm whose offer was not the lowest in the global tender were purchased through a State Government undertaking entailing an avoidable expenditure of Rs.28 lakhs. The absence of the equipment had imposed operational constraints apart from avoidable stress and strain on the flying crew.

(Paragraph 13)

IX. Extra expenditure in procurement of an equipment

The Air Force projected a requirement in 1979 for an equipment to meet an inescapable operational need. While a foreign firm offered to supply the equipment at a cost of Rs.180.73 lakhs, it was decided to procure the equipment through a public sector undertaking. The latter procured the equipment from the same foreign firm and supplied it to the Air Force at a cost of Rs.251.43 lakhs. There was no significant indigenisation effort. On the contrary, there was an extra expenditure of Rs.70.70 lakhs and the requirements of the Air Force had been fulfilled only partly seven years after it had wanted the equipment.

(Paragraph 17)

X. Non-establishment of indigenous overhaul facilities

The establishment of overhaul facilities for a trainer aircraft imported in 1975 was recommended by the Public Accounts Committee in 1983-84. Thereafter, two teams, specially constituted, recommended in 1984

the setting up of the facilities on techno-economic considerations and visualised savings of Rs.20 to Rs.25 crores on a long term basis. However, the decision was inordinately delayed and the Ministry decided against setting up the facilities only in 1987. The Ministry's decision was flawed based as it was on questionable assumptions relating to unit establishment and life extension of the engine. The cost of delaying the decision requires to be assessed.

(Paragraph 21)

XI. Naval training establishment

INS Shivaji, Lonavala, is the premier training establishment for Naval technical and engineering personnel. A review of the activities of the establishment as well as targets fixed and realised showed that the establishment of training facilities was not matched with training requirements. The inadequacy of the facilities established necessitated a Master Plan with an outlay of Rs.85 crores to update the facilities to the required standard during the period 1981-91. However, the facilities envisaged to be completed till 1988 have not been commissioned, affecting both training needs and operational preparedness. Shortages in instructional staff adversely affected the training efforts besides under utilisation of the training facilities. The review further revealed that the tardy progress of the major activities of the project was due to the absence of sound procedures for planning, implementation and monitoring.

(Paragraph 23)

XII. Establishment of a communication station

The necessity for a transmitting station to communicate with submerged submarines was accepted by the Government in 1971. The project was approved in 1976 at an estimated cost of Rs.12 crores and was envisaged to be completed by 1984. A review showed that the project was based on an inadequate technical and financial

evaluation. Lack of a systems approach resulted in system incompatibility. Consequently, various project activities were not properly dovetailed to ensure synchronisation. There had been serious cost and time overruns. The project cost is presently estimated at Rs.122.16 crores. It is still to be completed 12 years after its approval. This has led to the placement of an operational handicap on the Navy in an important area of communication and control.

(Paragraph 24)

XIII. Delay in setting up of training facilities

Certain ships of different types were received and commissioned between 1976 and 1983. Two contracts were concluded with a foreign Government for setting up related training facilities at a cost of Rs.34.87 crores. The review revealed inordinate delay in installation of the training equipment. The facilities, which were envisaged to be completed by 1982, would now be available by 1990, after 7 to 14 years of the commissioning of the ships. The time overrun which was attributed to the delayed completion of the civil works, resulted in non-installation of equipment worth Rs.24 crores and consequent creation of storage space at a cost of Rs.28.82 lakhs. The delayed completion of the facilities had an adverse impact on the training needs of the Navy.

(Paragraph 25)

XIV. Procurement of unsuitable steel bars

Two Chief Engineers of the Military Engineer Services at Cochin and Bombay received 3,000 tonnes of hot rolled deformed steel bars (HRD bars) in 1986 for use in lieu of tor steel. It was known at the time of procurement that the use of HRD bars was subject to certain restrictions. Against this background, the suitability of HRD bars for Defence projects was not determined before procurement. The bars were later found to be unsuitable. A quantity of 2,599.58 tonnes costing Rs.150.20 lakhs was being held for

over two years without any foreseeable utilisation.

(Paragraph 29)

XV. Procurement of spares for power generating equipment

For three standby power generating sets supplied and installed at a cost of Rs.18.11 lakhs, two years maintenance spares were purchased for Rs.15.77 lakhs through 84 supply orders. The procurement of spares by splitting orders was procedurally incorrect. In fact, there was no rationale for the procurement as spares worth Rs.0.46 lakh only were utilised during the two years for maintenance of the sets.

(Paragraph 30)

XVI. Procurement of a crane for a wharf

In 1980, the provision of a crane on a previously laid track was sanctioned at a wharf to provide shore support for the repairs and maintenance of Naval ships. The crane was to be delivered by 1984. Because of inadequate assessment of the track, the design of the crane had to be changed during its manufacture to match the track. Thereafter, the track itself was removed and relaid. This led to the crane not being made operational even after two years of its delivery. It also led to the hiring of crane facilities. Consequently, an asset worth Rs.69.77 lakhs was lying idle apart from the additional expenditure of Rs.6.39 lakhs.

(Paragraph 31)

XVII. Over provisioning of synthetic resin

Although the stock of synthetic resin during 1979-80 was in excess of the Navy's requirement by 15,075 litres, a quantity of 30,000 litres was added in the annual review demand. To make matters worse, the utilisation of the resin had ceased due to lack of spare capacity to manufacture oil based paints. Consequently, the Navy was holding a stock costing Rs.7.97 lakhs for over seven years. There was no demand for this resin.

(Paragraph 32)

XVIII. Modification of plotting tables on certain ships

Modification of plotting tables fitted on board nine Naval ships was considered essential to remove operational constraints. Delays in developing the modification imposed an operational handicap. Further, out of nine ships originally planned to be modified, only five will have been finally modified. The supply of modification kits is expected to be completed by 1990 and would result in an avoidable expenditure of Rs.18.97 lakhs.

(Paragraph 38)

XIX. Construction of patrol vessels for the Indian Navy

The construction of four patrol vessels at a cost of Rs.120 crores to maintain a certain force level was approved by Government in 1982. The vessels were designed around a retrograde propulsion technology even though more advanced technology for Naval ships was accepted as far back as 1979. The cost of the vessels to be delivered from 1988-89 onwards had gone up to Rs.201.72 crores. Though vessels with the retrograde propulsion technology were not able to achieve the required speed, approval for four more vessels at a cost of Rs.230.84 crores with such propulsion was given in 1986. There was evidence of flawed selection and procurement of the engine for the vessels resulting in an extra expenditure of Rs.4.98 crores. The delivery of the engines, which was due in 1983, was made between 1985 and 1986, thereby delaying the delivery of the vessels by three years and placing an operational handicap on the Navy.

(Paragraph 41)

XX. Import of Data Bus for certain ships

The preference of Naval HQ for the Data Bus of a particular firm caused an extra expenditure of Rs.2.97 crores due to the rejection of another firm's offer which was techno-economically acceptable. This apart,

the delay in selecting the Data Bus and concluding the contract, compounded by the delay in delivery, necessitated reversion to the conventional method and procurement of equipment worth Rs.1.88 crores as an interim arrangement. The Data Bus, delivered between March-August 1988, would be retrofitted during 1988 and 1991 on board the three ships which have already been commissioned. By that time, an indigenous Data Bus which has been developed by a Naval laboratory at a cost of Rs.4.30 crores and is undergoing evaluation trials on board one of the ships would be available.

(Paragraph 42)

XXI. Design and development of an inter-services pilotless target aircraft

A project was sanctioned in 1980 at a cost of Rs.21.50 crores for the indigenous design, development and manufacture of a pilotless target aircraft (PTA). This was required by the three services for air-to-air and surface-to-air weapon training and live firing exercises. The review revealed weaknesses in planning, co-ordination, monitoring and implementation of various project activities leading to serious cost and time overruns. The project estimates had been revised from Rs.21.5 crores to Rs.81.02 crores besides extending the period of completion to 1990 instead of 1985. The delay in development not only led to the piecemeal import of PTAs at a cost of Rs.21.28 crores but also adversely affected training efforts and evaluation of weapon systems.

(Paragraph 46)

XXII. Development of a missile target

The development of a missile target was sanctioned in 1974 at a cost of Rs.3.12 crores. Although development was envisaged to be completed by 1981, it was actually completed in 1986 at a cost of Rs.4.71 crores. During the 12 year development period, the unit cost had increased from Rs.2.5 lakhs to Rs.14 lakhs thereby making its production uneconomical. Further, the development of

the target was not stopped in 1980 when a project for a more advanced target was sanctioned. Finally, not only was the development cost of Rs.4.71 crores infructuous as the target was not productionised, weapon training, too, suffered due to use of imported targets of limited value.

(Paragraph 48)

XXIII. Working of Naval Research and Development laboratories

The research and development laboratories at Cochin, Visakhapatnam and Bombay cater specifically to the requirements of the Navy. A review of these laboratories covering budgetary, financial and accounting matters, status of various projects undertaken, manpower planning, availability and utilisation and inventory control was carried out which revealed serious weaknesses in their working. There was evidence of poor budgeting and lack of effective control which resulted in serious time and cost overruns. Dates of completion were not adhered to in 60 per cent of the projects closed during the period 1978-87. The delays ranged upto 13 years in 54 per cent of the cases. The increase in costs varied between 3.8 and 231.7 per cent.

Due to lack of effective inventory control and proper stock taking, stores worth Rs.268 lakhs were not returned to stock and stores costing over Rs.23 lakhs were purchased just before or after closure of the projects. During 1982-87, machinery costing over Rs.741 lakhs was purchased but in the absence of proper records it was not possible to verify their utilisation and maintenance. Lack of performance budgeting, systems of planning, forecasting, programming and performance monitoring of the projects also resulted in redundancies in procurement of

machinery and creation of assets at huge costs. There was no system to recover costs of development on transfer of technology to various production agencies. The Ministry agreed with the audit findings and stated that remedial action was being taken.

(Paragraph 49)

XXIV. Light Combat Aircraft project

The development of a multi-role, light combat aircraft to meet the operational requirement of the Air Force after 1990 was sanctioned by Government in August 1983 at a cost of Rs.560 crores to be completed over a period of 8 to 10 years. As against eleven work centres identified to undertake the development work, only five work centres have been assigned jobs. A monitoring agency was constituted only in June 1984 and technical parameters finalised in 1985. Even the project definition phase has been delayed by more than two years. In the meantime, the escalated project cost is estimated to be over Rs.750 crores. The power plant project, estimated to cost Rs.405 crores has not yet been sanctioned. Engine development is behind schedule and the targetted availability of the production version by 1997 will lead to a mismatch between the production of the aircraft and the availability of an indigenous engine. No decision about weapons for the aircraft has been taken so far. In spite of an expenditure of Rs.132.26 crores, several targets have not been realised due to weaknesses in planning, monitoring and execution apart from inadequate financial management. Since the aircraft will be inducted only by 1996, Government need to review the delays as well as consider alternative arrangements to meet the requirements of the Air Force from 1990 onwards.

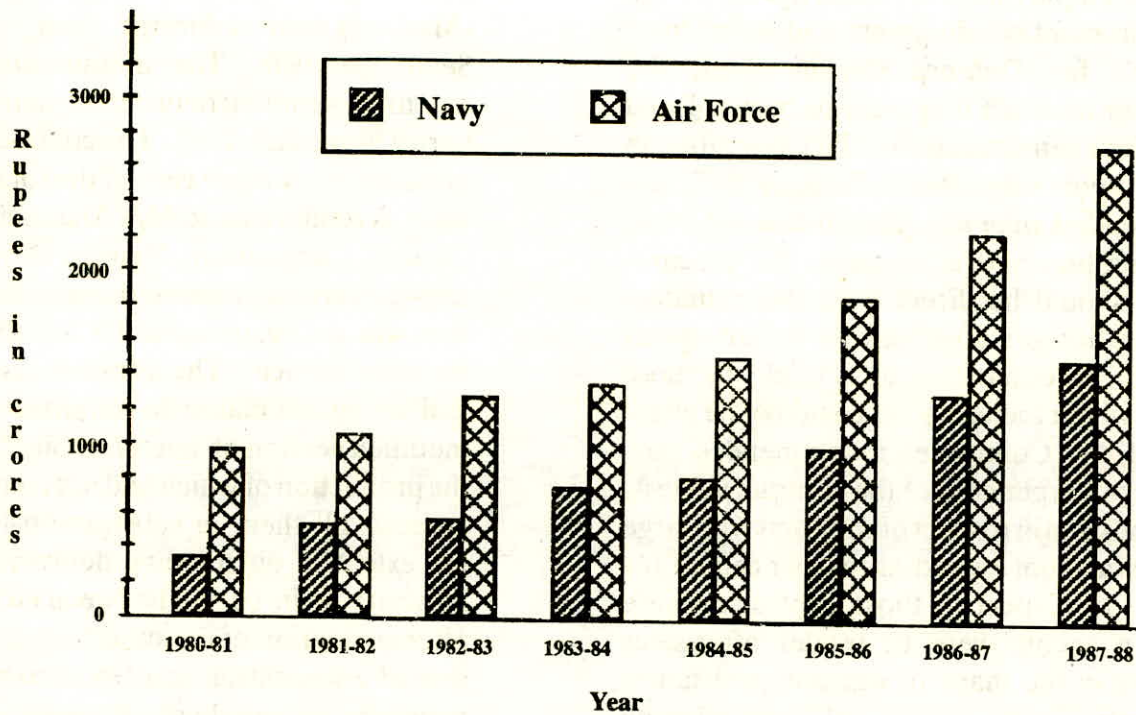
(Paragraph 50)

CHAPTER I

1. GENERAL

The outlay on the Armed Forces has grown from Rs.3,604 crores in 1980-81 to Rs.12,378 crores in 1987-88. The share of

the Air Force and the Navy in the total outlay has also recorded a steady growth. The quantum of increase in the allocation for these two Services is indicated below:



A significant proportion of the outlays on these Services goes towards capital acquisition, stores and maintenance works.

The Navy has undertaken major projects comprising acquisition of new ships, setting up of maintenance facilities, construction of communication projects and the strengthening of the Naval Aviation Arm. Modernisation and improvement of existing shore support facilities to match new acquisitions has also been undertaken.

The Air Force is being re-equipped with a variety of modern aircraft, stores and weapons in a planned manner. This re-equipment includes the induction of highly

sophisticated and advanced technology multi-role aircraft, the strengthening of the transport fleet as well as augmentation of the helilift capability.

The Defence Research and Development Organisation attends to specific needs of the Air Force and the Navy. Four laboratories are dedicated to Air Force research and development and three function to cater to the Navy's requirements. Diverse projects such as the development of an integrated electronic warfare system for the Navy and the design and development of a multi-mission light combat aircraft for the Air Force have been taken up.

CHAPTER II
MINISTRY OF DEFENCE

2. Payment of commission to Indian agents

Government appointed a Committee in September 1976 to go into the question of employment of Indian agents for the procurement of equipment and stores from abroad for Defence Organisations, the manner in which they were to be employed and their remuneration. The Committee in their report submitted in January 1977, recommended, *inter alia*, that in cases of arms, ammunition and equipment, the procurement should be direct from the manufacturer wherever possible and Indian agents should be eliminated as a rule. In those cases where Indian agents could not be eliminated, the Committee recommended payment of 0.5 per cent of the contract value as commission in respect of contracts with large values and not exceeding two per cent in any case. In respect of those contracts where Indian agents were to render after-sales service in the shape of warranty assistance, assistance in installation and commissioning etc., the Committee recommended payment of 7.5 per cent commission on contracts upto Rs.5 lakhs, five per cent on contracts between Rs.5 lakhs and Rs.10 lakhs, three per cent on contracts between Rs.10 lakhs and Rs.25 lakhs and two per cent on contracts over Rs.25 lakhs. The recommendations of the Committee were accepted by the Government and were communicated to the Service Headquarters (HQ) in September 1977. The percentage of commission was further revised by the Government in March 1982 as 10, 7.5, 5 and 2 per cent on contract values upto Rs.5 lakhs, Rs.5 to 10 lakhs, Rs.10 to Rs.25 lakhs and over Rs.25 lakhs respectively. The implementation of the Government order was test checked in Audit and certain cases, where the services of agents were being availed of and commission paid

at exorbitant rates, were noticed. These cases are illustrated below:

- (i) A contract for the supply of a certain quantity of ammunition 'X' was concluded by the Ministry of Defence (Ministry) with a foreign firm in September 1976. The ammunition was to be supplied between September 1979 and July 1981. The contract provided for two per cent of the total value as commission to M/s Anatronc General Corporation, New Delhi in non-convertible rupees though the firm was not responsible for any after-sales service. The contract also had an option clause to purchase a modified version of ammunition 'X' the production of which had not commenced till then, in substitution to the extent of outstanding deliveries in whole or in part. The Naval HQ, after evaluation of the modified version of ammunition in 1978, recommended its purchase instead of ammunition 'X' with an increase in the quantity. This was accepted by the Ministry in March 1979 and the contract was amended in July 1979 incorporating these changes. Though the contract was substantially revised in July 1979, no attempt was made by the Ministry to either delete the clause relating to the agency commission in total or to reduce the commission to the maximum permissible 0.5 per cent. The Ministry stated in September 1988 that the supplementary agreement of July 1979, incorporated change in type of ammunition, increase in the quantity, change in the delivery schedule and the cost. According to the Ministry, the other

clauses of the contract including that relating to payment of commission to Indian agents, were not re-negotiated. No reasons were, however, given for not re-negotiating the agency commission clause in terms of the September 1977 guidelines. Consequently, M/s Anatron General Corporation, New Delhi was paid a sum of Rs.67.87 lakhs as agency commission against a permissible amount of Rs.16.97 lakhs.

- (ii) Based on an indent raised by Naval HQ in November 1979, the Supply Wing (SW) of an Indian Mission abroad concluded a contract in January 1980 with a proprietary firm in New York for the supply of an equipment with accessories at a cost of Rs.12.52 lakhs in free foreign exchange (FFE). The contract included 10 per cent commission amounting to Rs.1.25 lakhs to M/s Photophone Ltd, Bombay against the admissible two per cent even though no after-sales services was involved.
- (iii) Against Naval HQ indents, the SW concluded five contracts between November 1983 and June 1984 with another proprietary firm for the procurement of spares for engines at a cost of Rs.72.36 lakhs in FFE. The contracts provided for agency commission amounting to Rs.10.84 lakhs to their Indian agents M/s Greaves Cotton Company, Bombay at a flat rate of 15 per cent as against the admissible two per cent, even though no after-sales service was involved.
- (iv) In another case, four contracts were concluded by the SW between July 1983 and March 1984 at a cost of Rs.25.85 lakhs in FFE with four foreign firms. Although the agents were not responsible for after sales-serv-

ice, provisions were made in the contracts for paying a sum of Rs.1.22 lakhs towards agency commission to Indian agents ranging from 3 to 7.5 per cent against the maximum of two per cent admissible in such cases.

- (v) Another contract concluded by the SW in July 1984 with the another firm for the supply of flying helmets of different sizes at a cost of Rs.4.33 lakhs in FFE provided for 15 per cent commission amounting to Rs.0.65 lakh to their Indian agent, M/s Praga Industries (P) Ltd, Coimbatore, for representation and after sales service as against the maximum of 10 per cent permissible in such cases.

Similar payments of agency commission have been commented upon in the Report of the Comptroller and Auditor General of India, Union Government, Defence Services (Army and Ordnance Factories) for the year ended 31 March 1988, No.2 of 1989. The Ministry stated in September 1988 that the Department of Supply has not issued any guidelines on the quantum of agency commission to be paid to Indian agents by their principals abroad and each case is left to be decided on its merits. It did not indicate, however, as to why its guidelines were not made applicable to all Defence equipment that was imported and the cost of which was debited to the Defence estimates irrespective of the organisation arranging the procurement.

In sum, the guidelines issued by the Ministry of Defence for regulating payment of commission to Indian agents were not enforced in respect of its purchases made through departments of other Ministries. The violation of its own guidelines resulted in the avoidable payment of Rs.62.21 lakhs as agency commission in the contracts examined in Audit.

3. Hiring of accommodation

In 1983 it was assessed that the Directorate of Naval Design (DND) required a substantial increase in office accommodation commensurate with the increase in design activities. Since additional accommodation was not available from the Defence pool or with the Director of Estates, the Ministry of Defence (Ministry) advised the Naval Headquarters (NHQ) in February 1984 to consider hiring accommodation from private sources. Pursuant to advertising their requirement, NHQ considered a particular offer for a building which had 43,798 square feet of carpet area in Delhi.

In August 1985, the NHQ communicated their willingness to hire the building at a monthly rent of Rs.1,75,192 to the estate agent. This decision was taken without obtaining the advice or concurrence of integrated finance and also without negotiating the rent with the landlord as required by a Committee set up by Government for fixing rents.

The lease agreement was signed on 16th September 1985 and the building taken over by NHQ on the same date. The building required certain modifications, additions and alterations which were completed in October 1985. The DND was relocated in the building on 13th January 1986, almost four months after the building had been taken over. This resulted in payment of rental worth Rs.6.81 lakhs without any benefit.

More substantively, the suitability of the building for the work of the DND was not assessed carefully. It was noticed that 60

per cent of the usable area was in two basements which required to be airconditioned before they could be utilised as work areas. The fact that basements used as office areas required airconditioning in terms of the building bye-laws of Delhi was not kept in view while clearing the building for housing the DND. The Ministry stated in September 1988 that the requirement of airconditioning was not known to NHQ. The airconditioning arrangements for this building, taken on short lease, were sanctioned by the Ministry in October 1986 at an estimated cost of Rs.22 lakhs. The work is expected to be completed by October 1988. Meanwhile, the three year lease expired on 15th September 1988 and a proposal to enter into a fresh lease for another three years is stated to be under the Ministry's consideration. The Ministry further stated that the basement was partially used temporarily for storage accommodation as it could not be used for office accommodation.

Thus, during the entire period of the lease of three years, 60 per cent of the area hired at a monthly rent of Rs.1.75 lakhs for office accommodation remained unutilised due to its unsuitability. Clearly, therefore, 60 per cent of the rent paid (Rs.37.84 lakhs) so far has to be viewed as infructuous. The action of the NHQ in communicating the rent to the agency before negotiating the rates and without obtaining concurrence of integrated finance as required under extant orders, the hiring of a building which did not satisfy the requirement of the building bye-laws in Delhi and airconditioning of a private building at a cost of Rs.22 lakhs merit investigation.

CHAPTER III

AIR FORCE

REVIEWS

4. Air transport facilities for VVIPs and VIPs

4.01 Introduction

The Indian Air Force (IAF) provides air transportation to VVIPs/VIPs within the country as also to visiting Heads of States and Governments. A communication squadron (squadron) created for this purpose in 1947 is based in Delhi. The resources provided for the squadron in terms of manpower and aircraft are reviewed and revised from time to time on a variety of considerations.

4.02 Scope of Audit

A review was carried out in Audit relating to the procurement, utilisation, serviceability and maintenance of aircraft available with the squadron. Also, rules and procedures for arranging special flights, effecting recoveries from officials for both private and official visits and costs incurred in providing special transportation were examined in respect of data available for the period 1984-85 to 1986-87.

4.03 Organisational arrangements

The squadron is under the functional and administrative control of Headquarters Western Air Command. Requests for air lifts for entitled persons are made direct to Air Headquarters (HQ) and, in respect of others, requests are made to the Ministry of Defence (Ministry). The flights are then arranged by the squadron on receipt of a communication from Air HQ. The docu-

ments connected with the flights are maintained by the squadron and Air HQ.

4.04 Highlights

- **The audit of the squadron revealed several cases of violation of rules and procedures such as non-receipt of passenger manifests, duty flight certificates and indemnity bonds.**
- **Delays in the procurement of aircraft 'A' resulted in payment of lease charges amounting to Rs.13.85 crores to Indian Airlines (Airlines) till such time the aircraft was inducted and Rs.1.81 crores even after its induction. Further, certain aircraft 'B' were withdrawn from service prematurely and replaced by similar aircraft leading to avoidable expenditure. Poor serviceability in respect of aircraft 'C' was noticed.**
- **Flying training of pilots was far in excess of that authorised and led to a needless expenditure of Rs.2.26 crores.**
- **The procurement of aircraft 'A' was avoidable as the need had been established for an aircraft with a smaller passenger capacity. Consequently, there were several occasions of uneconomic use of aircraft 'A'. The incidence of empty flying was significantly high and ranged between 70 and 80 per cent of total flying hours in case of aircraft 'B'. The empty flying of aircraft, contrary to Government orders, resulted in an avoidable loss of Rs.8.70 crores.**
- **Carrying friends and relatives of VVIPs/**

Note: Aircraft 'A': Boeing 737, Aircraft 'B': MI-8 helicopter, Aircraft 'C': HS-748, Aircraft 'D': TU-124, Aircraft 'X': Dauphin helicopter

VIPs and showing them as officials was of questionable propriety.

- The rates for official and unofficial travels have not been revised in line with increases in costs.
- The results of the review point to the need for comprehensively evaluating the cost effectiveness of the services provided by the squadron as well as for ensuring that the essentially sound rules and procedures are adhered to scrupulously. The scope for effecting greater efficiency and economy is considerable.

4.05 Establishment

Twenty three aircraft of various types, including type 'D', were in operation with the squadron in 1969. In 1970, aircraft other than 'C' and 'D' were withdrawn. In April 1984, aircraft 'A' was inducted replacing aircraft 'D'. Aircraft 'B' was also inducted in the squadron in October 1985. Presently, two aircraft 'A', six aircraft 'B' and seven aircraft 'C' are positioned in the squadron.

An analysis of the average sanctioned and posted strength of officers and airmen in the squadron during the period 1984-85 to 1986-87 revealed considerable deficiencies of pilots, airmen and others actually posted vis-a-vis the sanctioned strength. The Air Force Standing Establishment Committee (AFSEC) recommended in June 1986 a strength of 15, 16 and 32 pilots each for aircraft 'A', 'B' and 'C' respectively. However, the revised establishment had not been sanctioned till October 1988. Further, it was seen that the number of engineers of various trades during the above period was inadequate. The Ministry stated in October 1988 that the shortage of manpower was compensated by observing longer working hours.

4.06 Procurement and leasing of aircraft 'A'

The Government approved in February 1977 the procurement of two aircraft

for augmenting the strength of the squadron. Statistical analysis of the demand for aircraft during 1976 to 1979 had revealed that on 62 per cent of the occasions, VVIP and VIP groups consisted of less than 15 members. It was, therefore, considered that two categories of aircraft which would accommodate a VIP group of 10 to 20 and around 30 respectively be evaluated for replacing aircraft 'D' which was to be phased out by 1981. Aircraft 'A' was not considered a suitable replacement because of its large size. The Ministry of Defence (Ministry), however, sanctioned in October 1981, the procurement of two aircraft 'A' with a carrying capacity of 54 passengers each in VIP configuration at an estimated cost of Rs.27 crores in free foreign exchange (FFE) through the Airlines keeping in view the existing maintenance infrastructure available with it. The Airlines received the aircraft in July and August 1983 and delivered the first aircraft to the IAF in June 1984 after utilising it for 553 hours over 11 months. The second aircraft was delivered to the IAF in April 1984 after the Airlines had utilised it for 209 hours over a period of eight months. Thus, aircraft 'A', approved for procurement to replace aircraft 'D' which was being phased out only in 1981, could be inducted in the squadron only by the middle of 1984. As a result of this delay in procurement, aircraft 'A' was taken on lease from the Airlines in 1981 and lease charges amounting to Rs.13.85 crores were paid to it by the Ministry till 1983-84. Even after induction of aircraft 'A' in squadron service, similar aircraft continued to be taken on lease from the Airlines and an amount of Rs.1.81 crores was paid to it by the Ministry for the period 1984-85 to 1986-87. The Ministry stated that the lease amount was paid as an accepted interim arrangement. The Ministry added that Air HQ conveyed their reservation about using brand new aircraft in the squadron due to various uncertainties like breakdown, difficulty in maintenance, non-familiarisation and risks.

4.07 Leasing of engines

In addition to leasing aircraft 'A', engines for the aircraft had also been taken on lease on various occasions during the period February 1985 to August 1986 and an amount of Rs.39.18 lakhs paid to the Airlines as lease charges. The engines continued to be taken on lease from the Airlines even after a spare engine for aircraft 'A' had been separately procured in October 1986 for the IAF at a cost of Rs.2.10 crores; the lease charges paid amounted to Rs.10.01 lakhs. The rationale for the procurement of a spare engine has not been explained especially in the background of the Ministry's contention at the stage when aircraft 'A' was being considered for induction that its selection would obviate the need for a spare engine on account of facilities available with the Airlines and, therefore, make it cost effective.

4.08 Modification of helicopters

In December 1982, the Ministry sanctioned modification of five aircraft 'B' (procured in December 1979 at a cost of Rs.1.08 crores each) at an estimated cost of Rs.11 lakhs each to VVIP standard. Of these, four aircraft were inducted in the squadron in early 1984. These aircraft, after completion of 3366.20 flying hours, which included 75.45 per cent empty flying, were allotted to other IAF units between November 1986 and March 1987, much before the completion of their total technical useful life. Modification kits fitted on these aircraft were transferred to four other aircraft at an estimated cost of Rs.2.5 lakhs per aircraft as sanctioned by the Ministry in November 1986 thereby incurring an avoidable expenditure of Rs.10 lakhs. Bulk head modification to the aircraft received in 1986-87 was also sanctioned in October 1987 for providing additional leg space for VVIPs and VIPs at a cost of Rs.25,000 per aircraft. The Ministry stated that these helicopters were withdrawn because they had completed their calendar life

prescribed for VVIP duties. The Ministry added that empty flying of aircraft 'B' is unavoidable. All aircraft 'B' dedicated for VVIP role cannot be used for VVIP tasks due to some special security standards and technical reasons.

4.09 Procurement of helicopters

Government had approved in July 1982 the procurement of six VIP version helicopters for the squadron at an estimated cost of Rs.18.88 crores. A study was carried out by a Joint Flight Evaluation Committee of the IAF and the Oil and Natural Gas Commission to identify a suitable helicopter. Aircraft 'X' was considered the most suitable for this role. A contract for the procurement of six aircraft 'X' along with 21 similar aircraft for corporation 'Y' was signed in March 1986 by the Ministry of Transport and Civil Aviation. Later, aircraft 'X' was not inducted in the squadron and were diverted to corporation 'Y'. Fresh approval of the Government was obtained in June 1987 to acquire six new version of aircraft 'B'. Thereafter, a contract with a foreign Government was concluded in July 1987 for the procurement of seven aircraft 'B' at a cost of Rs.20.80 crores. Six of these aircraft would be inducted in the squadron. The delivery of these aircraft was expected by September 1988. Thus, there has been a delay in the induction of aircraft.

4.10 Aircraft maintenance

Aircraft 'A' was being maintained by the Airlines since induction. It was seen that while the various checks for servicing of aircraft and aero-engines had been carried out on the basis of time schedules given in the maintenance directive, the flying hours and cycles completed between the checks were far less than those stipulated. Although not unusual, the sub-optimal use of the aircraft could have been avoided by a better rationalisation of the flying tasks. The total technical life of aircraft 'B' and its engine was indicated at 12,000 hours or 20

years and 12,000 hours or 6-7 overhauls respectively. The time provided between overhaul in respect of aeroengines and periodical major servicing was 1,000 hours for the old series and 1,500 hours for the new series. Five engines received in the squadron during October 1986 and March 1987 were withdrawn prematurely for major servicing.

Ten aeroengines of aircraft 'C' were withdrawn prematurely. Of seven aircraft with the squadron, one was grounded continuously for 14 months and another has remained unserviceable from April 1986 for want of certain rotables. While confirming these facts, the Ministry stated that serviceability of the fleet during 1984-85 and in subsequent years was affected as Hindustan Aeronautics Limited (HAL) could complete only 29 per cent of the rotatable repair task projected during the year 1984-85.

4.11 Flying training

Flying training to aircrew on aircraft 'A' was conducted in the squadron itself whereas such training on aircraft 'B' and 'C' was conducted at various places and the pilots of these aircraft posted in the squadron were already qualified. They, however, had to enhance their ratings to VVIP category. No flying hours for training of pilots on aircraft 'A' and 'B' in the squadron were prescribed.

The Ministry had sanctioned, separately in April 1984, 90 hours per month for training of pilots of aircraft 'C'. Contrary to the limits prescribed in April 1984, flying hours utilised on training of pilots of aircraft 'C' during the period 1984-85 to 1986-87 was abnormally excessive. The excess ranged between 16.03 and 90.75 per cent over the three year period. The cost of the excess flying worked out to Rs.2.26 crores. The Ministry stated that the task authorised was clubbed in the training author book by the squadron as procedurally it would be erroneous to show it as VIP task. However, the

figures of additional flying on training were obtained by Audit from separate data maintained for VIP tasks and training by the squadron.

4.12 Violation of rules

The rules relating to VVIP/VIP flights were framed in 1954 on the basis of the recommendations of a committee. These rules were amended periodically and detailed procedures were prescribed by Government in January 1981. No proforma, however, was prescribed for the requisitioning of aircraft by VVIPs/VIPs. Contrary to the provisions, passenger manifests in the prescribed proforma were not received in 74 cases during the period under review. Duty flight certificates were not received from certain departments. Indemnity bonds as well as duty flight certificates in respect of various civilian passengers were not on record in many cases. No authority in support of an increase or decrease in the number of passengers than those actually shown in the passenger manifests sent earlier with the requisition was available. On several occasions, while aircraft were provided, the flights were not entered in the flight authorisation book. In certain cases, flights undertaken were regularised subsequently by issuing signal messages. In the background of the significant and varied nature of procedural irregularities, it was not possible for Audit to confirm that the flights were undertaken with due authority for approved purposes. The Ministry confirmed the facts and stated that the process of regularisation is being adopted because the airlifts are usually provided under emergent circumstances.

4.13 Empty flying

Government orders of January 1981, require, *inter alia*, that it should be ensured in all cases that unnecessary flights by aircraft returning empty from destinations and going back to collect the passenger concerned be avoided. Contrary to these provisions, aircraft 'A', 'B' and 'C' were deployed

for empty flying on several occasions during the three year period 1984-85 to 1986-87 totalling 4394.35 hours.

A major portion of the empty flying was on account of positioning of the aircraft for the airlift of a VIP or the returning of the aircraft after the VIP had deplaned. The ratio of empty flying to the total flying hours was as high as 80.52 per cent in respect of aircraft 'B', 33.10 per cent in respect of aircraft 'C' and 34.58 per cent in respect of aircraft 'A' during the period 1984-85 to 1986-87. This resulted in a loss of Rs.8.70 crores. Clearly, better planning could have ensured reduced empty flying.

Admitting the facts, the Ministry stated that empty flying of aircraft 'B' is unavoidable as all the six aircraft dedicated for the VVIP role cannot be used for VVIP task due to some special security and technical reasons. The Ministry added that empty flying of aircraft 'A' and 'C' is utilised for training purposes. The fact, however, remains that flying hours for training are separately provided which ranged from 31 to 40 per cent of the total flying in respect of aircraft 'A' and 50 to 55 per cent in respect of aircraft 'C' which itself is excessive in relation to the accepted norms.

4.14 Economy of aircraft usage

The maximum pay load capacity of aircraft 'A' was 126 passengers. The capacity was reduced from 126 to 54 passengers to cater to VVIP standards. Similarly, the pay load capacity of aircraft 'C' was also reduced from 43 passengers to 20 passengers. It was, however, noticed that even the reduced pay load capacity of both aircraft was not fully utilised. On several occasions, VVIP/VIP groups consisting of less than 20 passengers utilised aircraft 'A' (on 298 occasions during 1984-85, on 239 occasions during 1985-86 and 243 occasions during 1986-87).

The Ministry stated that the reduced pay load is due to the fact that the VVIP

limits his entourage for his own reasons and the VIP has been made to restrict his entourage by the Government.

Government's directives of January 1981 also state that, except for VVIPs, other entitled persons should make use of commercial air services on official duty whenever possible.

Contrary to these directives, aircraft 'C' was utilised for the airlift of only one VIP to places directly connected by commercial air services on as many as 32 occasions during the period 1984-85 to 1986-87.

Similarly, two VIPs were carried on 75 occasions and 10 or less than 10 passengers on 555 occasions during the same period. VIP groups consisting of 11 to 15 passengers and 16 and above were airlifted only on 107 occasions and 59 occasions respectively. There is considerable evidence, therefore, that use of high capacity aircraft for the airlift of a single passenger or a small number of passengers was not economically justified keeping in view the high operating costs of Rs.72,000 per hour for aircraft 'A' and Rs.31,539 per hour for aircraft 'C'. While confirming the facts, the Ministry stated that every possible care is taken to provide suitable aircraft as per VIP requirements but there are occasions when provisioning of high capacity aircraft even for a small entourage is not avoidable irrespective of its economic viability due to non-availability of low capacity aircraft at that point of time. .pa

4.15 Propriety

The orders of January 1981 allow certain VVIPs to take any other passenger with them as they consider necessary for the purpose of their journey. The propriety aspect of this provision was evidently lost sight of on several occasions. It was seen in Audit that persons who were relatives of VVIPs and VIPs, their sons, daughters, daughters-in-law, as well as friends and guests travelled frequently with VVIPs and VIPs.

In the passenger manifests, such persons were shown as officials and their nature of duty was also reflected as official which was apparently incorrect. The Ministry stated that the choice/selection of VVIP/VIP entourage is entirely with the VVIP/VIP secretariat. However, Air HQ/Ministry could ensure that whenever any airlift to VVIP/VIP was provided, necessary approval at the appropriate level was obtained.

4.16 Non-revision of rates

In respect of the unofficial visits of the VVIP, a recovery rate of 61 paise per statute mile per passenger was fixed in 1974 based on the then prevailing fare structure of the airlines in respect of stations which were not connected by regular air service. The rate was revised to 79 paise per air mile per passenger in September 1981 and was not revised thereafter even though the Airlines had increased the passenger fares from time to time. Also, the Railways and State road transport undertakings have increased their fares periodically. The rate of 79 paise was unrealistic and required revision especially when the recoveries were being effected at higher rates for official visits. The Ministry stated that a proposal to revise the rates from 79 to 84 paise and to include levy of fuel charges and additional surcharges was referred to the Ministry of Finance in 1984 but has not been finalised till date (October 1988). Thus, the Government has lost the opportunity of increasing its revenues to the extent of Rs.1.98 crores during the period 1984-85 to 1986-87, by not revising the rates.

The recovery rates in respect of official travel in aircraft 'A' and 'C' have not been revised since June 1984. However, the recovery rates in respect of aircraft 'B' were being revised every year. Nevertheless, the recovery rates of Rs.40,000, Rs.12,000 and Rs.15,910 per hour fixed in respect of aircraft 'A', 'C' and 'B' respectively were much lower compared to the operating (direct and indirect) costs of the three types of aircraft.

4.17 Boarding and lodging expenditure of aircrew

According to a Government order of October 1960, State Government and Union Territory Administrations were responsible for making arrangements for the accommodation, boarding and transport of aircrew engaged on the flights of VVIP/VIP aircraft within the prescribed limits, if not available in the local Air Force station. The expenditure on this account for official visits was required to be reimbursed by the indenting department or Ministry or the VVIP concerned directly to the State Government whereas for the visits of certain dignitaries, the expenditure was to be met from the Defence Services Estimates. However, for a VVIP's unofficial visits, such expenditure was recoverable from the VVIP directly. The expenditure on account of boarding, lodging and transport of aircrew ranged between Rs.160.00 and Rs.1,32,175.00 for official visits and between Rs.284.00 and Rs.43,089.55 for unofficial visits during the period 1985-86 and 1986-87 which was apparently excessive as compared to rates fixed in August 1986.

4.18 Outstanding bills

Bills to the extent of Rs.77.59 lakhs were raised by the IAF for flights provided to VVIP/VIPs during 1984-85 and 1986-87. An amount of Rs.12.85 lakhs was outstanding as of October 1988. Additionally, a sum of Rs.14.14 lakhs including Rs.11.88 lakhs from a former VVIP on account of a flight provided to him in 1979, is yet to be recovered.

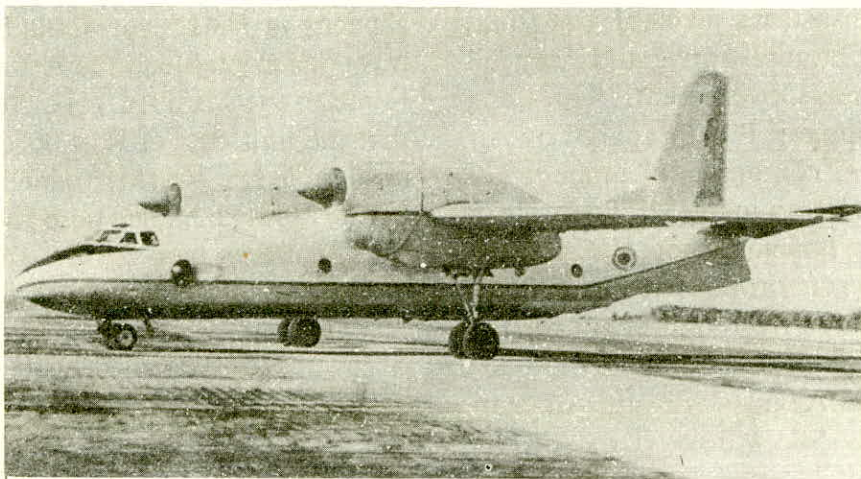
5. Medium Tactical Transport Aircraft

5.01 Introduction

The Air Force (IAF) had recognised the urgent need to identify and induct suitable Medium Tactical Transport Aircraft (METAC) to replace the Dakota and Packet aircraft which had been purchased in the late forties and fifties and had formed the

backbone of the transport fleet. The need for their replacement was recognised in 1965. Various aircraft were considered as possible replacements. In 1972, it was decided to induct the HS-748 (Military Freighter version) as METAC. Its manufacture was

undertaken by Hindustan Aeronautics Limited (HAL). However, this aircraft was found unsuitable for the METAC role. Thereafter, AN-32 aircraft was procured from abroad in 1984 and is in service with the IAF.



AN-32 Medium Tactical Transport Aircraft

5.02 Scope of Audit

The process of selection and procurement of METAC has been subjected to detailed examination. The impact of the delays in selection and procurement of the aircraft have also been assessed. The position relating to the operation and provision of adequate maintenance support to the aircraft have been examined and weaknesses in systems at various levels identified.

5.03 Highlights

- **Inadequate planning arrangements for the timely and cost effective induction of the METAC were in evidence. The HS-748 (Military Freighter) aircraft was allocated to the Army and the Air Force even though both services had emphasised that it did not meet their requirements. The investment of Rs.76.87 crores was, thus, largely infructuous.**

Further, the delay in the selection of the METAC led to the sub-optimal utilisation

of heavy transport aircraft in the METAC role.

- **There were problems also with the timely ordering of AN-32 aircraft and in not exercising option clauses advantageously.**
- **The review also illustrates cases of mismatch between the induction of the METAC aircraft and the availability of maintenance and support facilities.**

5.04 Procurement of HS-748 aircraft

The aircraft was basically to meet the diverse requirements of the Army and the Air Force. The primary purpose of the METAC is to enhance paratroop drop and airdrop capabilities. An Outline Requirement (OR) for the METAC was issued by Air Headquarters (HQ) in 1964. The METAC was to replace the ageing Dakotas and Packets as their maintenance was uneconomical. Several alternatives explored to meet the requirement were found unsuitable, mostly on technical grounds. In 1970,

it was decided to develop the HS-748 aircraft as a freighter version. In 1972, the induction of HS-748 Military Freighter (MF) aircraft as the METAC was formally authorised. Essentially, it was meant to replace the Dakota and Packet aircraft immediately and to utilise idle capacity at HAL, Kanpur. It was stated that loss of workload was not only disastrous for HAL but could result in grave administrative and financial problems for the Government. The Long Term Re-equipment Plan prepared by Air HQ in June 1972 contemplated induction of HS-748 (MF) aircraft in the METAC role in the Paratrooper Training School (PTS) during 1974-75 and in squadron service from 1975-76. Their progressive requirement for the period upto 1989-90 worked out to 158 aircraft. Again, in August 1973, an Air Staff Requirement (ASR) was issued by Air HQ for the METAC in supersession of the OR issued in 1964. This was tailor made to conform to the potential of HS-748 (MF) aircraft. However, it was not to be taken as a yardstick to evaluate other options for the METAC role. The decision to induct this aircraft was taken even though Air HQ had categorically stated that it was unsuitable for the intended role. Army HQ, too, had expressed its serious reservations on using the HS-748 (MF).

Purchase after manufacture of 48 HS-748 (MF) aircraft from HAL at a unit cost of Rs. 149.65 lakhs was sanctioned in April 1973. A study revealed in October 1973, that the HS-748 (MF) fell short of the requirements of the Army as well as the Air Force. Consequently, it was decided to restrict the order to 10 aircraft because HAL had contracted materials for 10 aircraft from a foreign supplier. A sanction indicating a unit cost of Rs. 2.29 crores was accorded in January 1976. Simultaneously, in order to keep HAL busy, modification of 17 HS-748 Pilot Trainers to freighter version was also contemplated and sanctioned at a cost of Rs.2.07 crores in January 1976. This was

reduced to 10 aircraft in February 1980. In the meantime, the purchase of an additional 10 HS-748 (MF) aircraft from HAL was sanctioned in June 1978 at a unit cost of Rs.4.00 crores even though the earlier order had been reduced to 10 from 48 on account of the aircraft's unsuitability. Essentially, these orders were placed to utilise the idle capacity at HAL even though the aircraft was not acceptable to the Army and the Air Force in the METAC role. It was noticed that the unit cost of Rs.4.00 crores for the unsuitable HS-748 (MF) sanctioned in June 1978 was much higher than the unit cost of Rs.3.27 crores paid for the first lot of imported AN-32 aircraft in 1981.

A total investment of Rs.76.87 crores had been made in the manufacture and modification of HS-748 (MF) aircraft. This expenditure was largely infructuous in the light of the aircraft's shortfalls in performance which forced the IAF to continue their search for a suitable aircraft in the METAC role. According to the Ministry of Defence (Ministry), HS-748 (MF) aircraft were being utilised in a partial METAC role.

5.05 Procurement of AN-32 aircraft

Some new offers of METAC aircraft were considered between 1977 and 1979. These included the AN-32 aircraft. This aircraft came close to requirements on both financial and technical considerations. In order to maintain five squadrons of this aircraft over 15 years, a requirement of 95 aircraft was worked out. In September 1979, the induction of AN-32 aircraft in the METAC role and its procurement from abroad was sanctioned.

The unit cost for the first AN-32 aircraft in flyaway condition was negotiated at Rs.3.27 crores in case the contract at this rate was finalised in May 1981. For the purchase of another 45 aircraft at a unit cost of Rs.3.07 crores, an option was secured for finalisation of the contract within a further period of 90 days. This option, however, was

not exercised. A contract for the purchase of 50 AN-32 aircraft in flyaway condition was finalised in May 1981. The remaining 45 aircraft were proposed to be assembled under licence at HAL. This proposal was, subsequently, not found economical. Consequently, another contract was concluded in September 1981 for the purchase of 48 AN-32 aircraft in flyaway condition. This time, the unit cost payable to the supplier worked out to Rs.3.16 crores. By not exercising the option secured in May 1981 for the purchase of additional aircraft, avoidable expenditure of Rs.4.00 crores was incurred.

AN-32 aircraft were inducted in the PTS during the last quarter of 1984. They entered squadron service only during April 1986 to April 1988. Evidently, there was a delay of about 10 years in the induction of METAC aircraft in the PTS and squadron service in terms of the planned induction programme of the Air Force. This situation gave the Air Force no choice but to retain the Dakota and Packet aircraft upto 1988 and 1986 respectively in spite of their maintenance being uneconomical. The Ministry stated in October 1988 that essential tasks were met by pooling the available resources of the IAF and that lower priority tasks had to be undertaken by alternate means of transportation by road and rail. On the other hand, the METAC role was fulfilled by utilising long range heavy transport aircraft 'B' whose operating cost is higher than that of AN-32 aircraft.

5.06 Utilisation of AN-32 aircraft

It was noticed that there was a considerable shortfall in the annual flying efforts of AN-32 aircraft against the authorised tasks. The quantum of shortfall ranged from 49.3 per cent to 60.75 per cent during the period 1985-87. Similarly, the aircraft utilisation rate actually achieved against the monthly authorised utilisation rate in respect of individual aircraft was also short. The shortfall extended from 42.7 per cent in

1985 to 44.5 per cent in 1987. The main factors responsible for shortfall in utilisation were the large number of snags on the indigenously produced avionics, mis-matching of the supply of spares with requirements and problems in providing first and second line servicing to the aircraft. Serviceability was unsatisfactory even though it improved from 60.05 per cent in 1985 to 70.5 per cent in 1987. The aircraft-on-ground (AOG) position oscillated between 15.02 per cent in 1985 and 18.53 per cent in 1987. It was noticed that the non-availability of items against AOG demand and repair of rotables contributed towards the low serviceability of the aircraft. This was confirmed by the Ministry of Defence.

5.07 Maintenance of AN-32 aircraft

The contract concluded in May 1981 envisaged the setting up of repair, overhaul and defect investigation facilities for AN-32 aircraft and the complete range of aggregates as well as its engine well before the aircraft, engine and aggregates became due for repair or overhaul. However, contracts for technical assistance from the manufacturer in organising the overhaul of the AN-32 aircraft and its engine were concluded only in March 1987. Normal production from the repair lines in respect of the aero-engine and the airframe was expected from July 1990 and 1992 respectively. Until then, the repair work would be fully dependent on the manufacturer. Pending the setting up of repair facilities in India, 40 aeroengines had to be sent to the manufacturer for repair and overhaul during 1987 involving an expenditure of Rs.396.81 lakhs. Another 50 aeroengines were expected to be sent to the manufacturer during 1988-89. According to Air HQ, repair charges payable for these engines would amount to Rs.509.35 lakhs approximately. Similarly 56 aircraft are likely to come up for repair and overhaul upto 1991. This would have to be arranged by the manufacturer and would necessarily involve heavy expenditure. By the time repair

and overhaul facilities are set up in India, a considerable portion of the service life of a large extent of the fleet would be over. This would further affect the economics of the project. Better planning and co-ordination could have assisted in the timely setting up of repair and overhaul facilities. It was also noticed, in this context, that there were no identifiable monitoring arrangements which could have brought problem areas to light in a timely manner and suggested corrective measures. According to the Ministry, the delay in setting up of the repair facilities was mainly due to a late response from the manufacturers.

The service life of the aeroengine before the first overhaul was extended by the manufacturer from 1,000 to 1,200 flying hours in pursuance of an agreement concluded in November 1986. Air HQ, however, became aware of this only in July 1987. In spite of this, 30 aeroengines were sent to the manufacturer during 1987 after completing only 1,000 flying hours each. Evidently, their further life of 200 flying hours each was not made use of by the Air Force. It resulted in their premature overhaul without any valid reasons involving an avoidable expenditure of Rs.50.93 lakhs on a pro-rata basis. The Ministry stated that a protocol extending the life of engines from 1,000 to 1,200 flying hours was signed only in January 1988.

5.08 Servicing facilities

An examination of the timely availability of first and second line servicing facilities revealed a significant mismatch between the induction of the aircraft and the availability of such facilities. At an Air Force Station 'A' where two squadrons of AN-32 aircraft were inducted between October-December 1984 and February-March 1985, the administrative approval for commencing the necessary works services was accorded only in March 1984. The services were completed in May 1987 at a cost of Rs.74.73 lakhs.

Similarly, at a Transport Training Wing, located at Station 'B', the aircraft were inducted between April 1986 and June 1986. The administrative approval for the works services was accorded only in January 1986 at an estimated cost of Rs.243.64 lakhs. The works were expected to be completed by June 1991. By April 1988, however, only 13 per cent of the works had been completed. The station authorities had stated in October 1986 that while second line servicing and snag rectification was imminent in respect of certain aircraft for which it was necessary to have fully established servicing bays, there was absolutely no accommodation to even keep the test equipment let alone the establishment of facilities. Air HQ have not indicated why it was not possible to synchronise the availability of these facilities with the arrival of the aircraft. According to the Ministry, squadrons had been deployed to meet the operational requirements and the bases were geared to undertake second line servicing and meet the operational requirements. Action for permanent facilities had also been initiated on the works channel.

6. Procurement, manufacture, operation and maintenance of an aircraft

6.01 Introduction

A contract for the purchase of aircraft 'A' from abroad was concluded in June 1976. Its licence manufacture was undertaken by Hindustan Aeronautics Limited (HAL) in pursuance of another agreement concluded in August, 1976. The aircraft was inducted into service in 1977. The repair and overhaul of the aircraft and associated equipment rested with HAL.

6.02 Scope of Audit

The procurement, manufacture, operation and maintenance of the aircraft were reviewed in Audit. Besides, an analysis of the economics of production and repair and overhaul of the aircraft and aero-en-

gines was undertaken. Additionally, the planning aspects relating to connected activities were looked into.

6.03 Highlights

- The review highlights poor planning, project management and implementation alongwith little evidence of monitoring so as to optimise large investments in the air defence of the country.
- The basic economic and physical targets set in regard to savings in foreign exchange, cost of indigenous production of aircraft 'A' and utilisation of optimum installed production capacity could not be realised satisfactorily.
- Due to lack of adequate long term planning, the project for the manufacture of the aircraft had to be foreclosed which led to curtailment in the production programme, appreciable increase in the cost of production and considerable under-utilisation of the production line and licence fee besides significant redundancies in material.
- Reliability of the aircraft produced indigenously from raw material was poor. It had affected the serviceability of the aircraft considerably and resulted in avoidable expenditure of Rs.30.44 lakhs on their premature servicing.
- Flying efforts and monthly utilisation rate of the aircraft were also affected considerably.
- As a result of poor planning and management, the repair and overhaul facilities for aero-engine 'X' could not be established in time. It led to the repair and overhaul of a major portion of the aero-engines abroad involving an avoidable expenditure of Rs.45.68 crores. In fact, the repair abroad was uneconomical.
- Exploitation of the full life of aircraft 'A' was also doubtful as sufficient aeroengines to sustain its operation were not

available.

- **Maintenance backing for aircraft 'A' in the future was uncertain as the repair and overhaul facilities available in India were not adequate to take on the entire repair requirements of the aircraft and the aeroengine.**

6.04 Procurement

A contract for the purchase of 90 aircraft 'A' (70 combat and 20 trainers) and associated equipment was concluded with a foreign country in June 1976 at a total cost of Rs.200.65 crores. The aircraft was fitted with aeroengine 'X'. The purchase was primarily prompted by the overall aircraft deficiencies in the IAF caused due to slippages in production and repair of other aircraft by HAL. The delivery of the combat element was completed during 1976 and 1977 whereas the trainer aircraft were supplied during 1976 and 1980.

6.05 Licence manufacture

A licence manufacture agreement was concluded in August 1976. Licence fee amounting to Rs.13.60 crores was payable towards transfer of technology, technical documentation and technical assistance.

The Detailed Project Report (DPR) finalised in November 1979 provided capital expenditure amounting to Rs.45.46 crores (FE Rs.16.09 crores) and deferred revenue expenditure (DRE) to Rs.78.34 crores (FE Rs.38.65 crores). The annual production capacity was indicated as 36 aircraft 'A' and 40 aeroengines 'X' respectively. As per the DPR, 290 aircraft 'A' and 390 aeroengines 'X' were scheduled to be produced during 1978-79 to 1988-89 and 1978-79 to 1990-91 respectively. Production of aircraft 'A' and aeroengines 'X' from raw materials was planned to the extent of 220 and 265 respectively. A saving in foreign exchange estimated at Rs.222 crores was contemplated by producing aircraft 'A' indigenously. The net saving after taking into account the foreign

exchange expenditure on capital and DRE investment was assessed at Rs.167 crores.

6.06 Production and delivery

The manufacture and supply of 150 aircraft 'A' by HAL was sanctioned in December 1976. The estimated unit cost of the first five aircraft was Rs.139 lakhs and for the remaining 145 aircraft was Rs.150 lakhs each. The manufacture of another 70 aircraft 'A' at a total estimated cost of Rs.175 crores was sanctioned in April 1981. The delivery of all the aircraft was envisaged during 1978-79 to 1986-87 whereas the actual delivery was completed in 1987-88. The installed production capacity of 36 aircraft per year at HAL remained largely underutilised. The production programme of aircraft 'A' was foreclosed at 220 aircraft against 290 aircraft as originally planned in order to accommodate the manufacture of aircraft 'B'. It led to considerable redundancies in material besides an increase in the cost of production as the DRE had to be amortised over 220 aircraft against 290 planned. The Ministry of Defence (Ministry) were unable to indicate the value of the redundancies (October 1988). At the same time, the licence fee to the extent of 24.13 per cent viz.Rs.3.28 crores remained unutilised. It had also reduced the element of raw material production to 150 aircraft as against 220 planned. The final price paid to HAL for the supply of aircraft 'A' under various stages of production against the average sale price indicated in the DPR was more by 1.00 to 4.78 per cent and the price payable to HAL for aircraft produced under raw material stage was disproportionately high (42.56 per cent) when compared to the average sale price indicated in the DPR.

In the case of aeroengines also, the optimum installed production capacity of 40 engines per year at HAL remained underutilised considerably during 1978-79 to 1985-86. Further orders for the manufacture of aeroengine 'X' had not been placed by Air

Headquarters till April 1988. The Ministry stated in October 1988 that pending Government approval, the order for manufacture of aeroengine 'X' could not be placed. However, intention to proceed (ITP) was given in June 1987 only. It added that an order for the procurement of 90 engines had been placed on HAL.

The projections made in the DPR about savings in foreign exchange were also not realised. Taking into account the foreign exchange expenditure towards capital (Rs.16.09 crores) and DRE (Rs.38.65 crores) investment, the net saving worked out to Rs.80.70 crores as against Rs.167.00 crores anticipated. The saving would get reduced to Rs.40.84 crores if the cost of imported material towards production of electronic equipment amounting to Rs.39.85 crores is also taken into account. This saving is completely wiped out when rupee expenditure is considered. Rupee expenditure towards capital and DRE investment alone worked out to Rs.68.02 crores. Thus, the economics based on which the project for production of aircraft 'A' indigenously was undertaken had proved illusory with no real benefits as contemplated.

6.07 Operation and maintenance

Aircraft 'A' was inducted in service in early 1977. There was a delay in raising three squadrons ranging from two months to one year because of delay in building up of infrastructure like ground equipment, trained manpower etc. There were serious shortfalls against annual authorised flying tasks in respect of individual squadrons to the extent given below:

Year	1982	1983	1984	1985	1986	1987
Average	48.2	48.7	37.2	24.9	34.4	49.25
shortfall (per cent)						

Similarly, the average utilisation rate actually achieved by individual aircraft against the monthly authorised rate of utilisation

per aircraft was also considerably low as indicated below:

Year	1982	1983	1984	1985	1986	1987
Average utilisation (per cent)	43.5	46.4	28.8	14.0	26.7	30.7

The shortfalls in flying efforts and utilisation rate were ascribed to various factors such as aircraft serviceability, number of aircraft actually held, the availability of fully trained pilots and technical personnel. The average serviceability and position of aircraft on ground (AOG) was as under:

Year	1982	1983	1984	1985	1986	1987
Service-ability (per cent)	72.60	64.75	62.68	56.33	49.07	64.12
AOG (per cent)	7.23	11.40	15.80	17.78	23.83	11.20

Delay in replenishment of spares for aircraft procured from the foreign country, high rate of accidents, premature withdrawals in respect of aircraft produced by HAL from raw material and delay in supply of rotables and spares by HAL were mainly responsible for low serviceability and AOG. The aircraft produced by HAL from raw material stage had serious defects arising out of material failure and poor quality control during manufacture and inspection which affected the level of confidence in the aircraft. Besides, this increased the rectification rate and down time of the aircraft affecting their serviceability. The main problem areas, inter-alia, were structural deficiency, hydraulic and fuel leaks, malfunction of indigenous avionics, low reliability of compass and autopilot, engine unserviceability and altaz radars. Three aircraft 'A' due to low reliability, were decided to be overhauled at 450, 550 and 650 hours before the recommended servicing at 750-850 hours. The Ministry stated in October 1988 that only one aircraft had been sent for overhaul at 450 hours. Its overhaul was in progress. A decision on the premature overhaul of other aircraft would

be taken once the inspection report of the first aircraft is received. According to the fixed cost quotation for 1985-86, the overhaul cost for one aircraft would be Rs.30.44 lakhs. There were as many as 28 cases of incidents and accidents due to various defects etc. during January 1986 to November 1987 including two cases of accidents involving a loss of Rs.5.50 crores. The loss of one aircraft was attributed to design weakness. The second case remained un-resolved.

6.08 Repair and overhaul facilities

A contract for the overhaul of aero-engine 'X' was finalised in February 1980 and a working protocol signed in February 1981. The setting up of repair facilities for 180 engines per annum including repair and overhaul of aeroengine 'Y' fitted on another aircraft was envisaged. The repair and overhaul facilities were planned to be available by the end of 1983. However, the repair and overhaul work of aeroengine 'X' could commence only from January 1986. In the meantime, HAL carried out limited repair work only. The annual installed capacity for repair of aeroengines was increased to 210 from 1987-88. It included the repair of 90 engines 'X'. The total capital expenditure incurred for creating repair and overhaul facilities for aeroengine 'X' amounted to Rs.1.94 crores. During 1977-78 to 1986-87, there were 539 repairable arisings of aeroengines 'X'. Of these, 262 aeroengines 'X' had to be sent abroad for repair and overhaul during 1978 to 1987-88 due to non-availability and delay in establishing the repair facilities in India involving an expenditure of Rs.44.35 crores. During 1988-89 (May 1988), seven additional engines were under despatch for repair at a total cost of Rs.1.33 crores. HAL could carry out repair and overhaul of only 74 aeroengines 'X' during 1982-83 to 1986-87. The unit cost of repair and overhaul of an aeroengine abroad during 1978 was Rs.14.40 lakhs whereas the repair charges payable to HAL for repair and overhaul done during 1985-86 was only

Rs.9.62 lakhs. Apparently, the repair and overhaul of aeroengines in the foreign country was not economical. In percentage terms, the annual installed repair capacity of 90 aero-engines 'X' could be utilised to the extent given below:

Year	1982-83	1983-84	1984-85	1985-86	1986-87
Capacity utilised (per cent)	3.33	6.66	11.11	22.22	38.88

Thus, the installed capacity at HAL, obviously remained largely underutilised. In fact, HAL could undertake repair to the extent of only 16.85 per cent of the arisings upto 1986-87. During 1987-88 to 1992-93, the repairable arisings of aeroengines 'X' and 'Y' were estimated to be between 258 and 169 annually. The installed capacity available with HAL for repair and overhaul of aeroengines viz.210, would not be sufficient to take on the anticipated repairable arisings of aeroengines 'X' and 'Y'. The existing capacity was not expected to be increased. However, the production line of aircraft 'A' was closed down by 1986-87. Further, the augmentation of the existing facilities was not cost effective. Consequently, as on 1st April 1988, due to inadequate repair facilities, 147 aeroengines 'X' were awaiting repair and overhaul. The repair agency abroad was also not ready to accept anymore overhaul of aeroengines 'X'. There were 111 cases of premature withdrawal of aeroengines 'X' during 1982-83 to 1986-87. In 63 cases the aeroengines had to be withdrawn before completion of half of their normal overhaul life due to various defects, excluding bird hits. The expenditure incurred on their repair and overhaul was not intimated by the Ministry. Taking into account the assets of aeroengines available on 1st October 1987, only 59.12 per cent of the balance flying hours left before expiry of the total technical life of aircraft 'A' left with the IAF could be done. On the whole, the exploitation of the total life of the aircraft appears to be doubtful due to non-availabil-

ity of sufficient aeroengines. In order to utilise the existing total technical life of aircraft 'A', the procurement of 128 aero-engines was considered essential by Air HQ. The Ministry stated that it had since been decided to procure 128 aeroengines 'X'. An order for 90 engines had been placed on HAL. The procurement of the remaining 38 engines had not been arranged (November 1988). It added that since the total technical life of aircraft 'A' had been extended from 1,800 to 2,400 flying hours or 30 years, the additional requirement of aeroengine 'X', rotables, raw material etc to sustain their operation during the extended life would be worked out and provisioned. Further, it stated that product support of HAL was to continue till the life cycle of the aircraft. HAL had plans to meet the full overhaul requirements of aeroengines 'X' by 1990-91 only. However, phasing out of aircraft 'A' would start from 1992 gradually. There were significant variations between repairable arisings, tasks approved by Government and tasks completed during 1978-79 to 1986-87. The arisings which remained unattended to during this period ranged from one to 17.

Three aircraft were sent to the foreign country for overhaul during 1981 at a cost of Rs.75.73 lakhs as the necessary facilities had not been established at HAL till then. As on 1st April 1987, 53 aircraft 'A' were awaiting repair and overhaul. This figure may go up if the position of anticipated repairable arisings and task approved is taken into account. The Ministry stated that as per fresh calculations done for preparation of overhaul task for 1989-90, it was expected that 35 aircraft including the backlog would be due for overhaul on 1st April 1989. Thus, the assets awaiting repair as on 1st April 1989 would work out to 13.56 per cent of the total aircraft available with the IAF.

The matter was referred to the Ministry in July 1988. However, the Ministry had not replied to the portion pertaining to HAL

till November 1988.

7. Development and operation of a computerised inventory control system at an equipment depot

7.01 Introduction

In order to enhance inventory management and to utilise the Air Headquarters (HQ) computer system to its optimum capacity, Air HQ proposed in August 1977 the setting up of a computerised inventory control system at its Equipment Depots and Air Store Parks. As a result of a feasibility study completed in October 1978, it was agreed by the Ministry of Defence (Ministry) in August 1979 to computerise the functions of an Equipment Depot (ED). Air HQ's proposed acquisition of hardware in 1980-81 which was concurred in by the Ministry in September 1981. The hardware costing Rs.45 lakhs was acquired in August 1983, commissioned in November 1983 and the system became operational in November 1985.

7.02 Scope of Audit

A comprehensive audit of the entire process of the planning and acquisition of the electronic data processing (EDP) system and its subsequent operation, utilisation and maintenance was undertaken between April 1988 and July 1988. It covered project implementation and monitoring as well.

7.03 Highlights

- **Planning weaknesses were evident. These comprised the absence of an EDP strategic plan, the lack of clearly defined objectives and short posting of staff. This led to delays in systems analysis and design and further delayed utilising the system and optimising benefits.**
- **Although the feasibility study recommended an EDP system manufactured by a public sector undertaking, an entirely different system was imported which was not compatible with the existing system at Air HQ.**

- **Review arrangements were inadequate and consisted mainly of routine overseeing of planning and implementation by Air HQ. A high level steering committee was disbanded in 1980 and re-established in 1985 during which period the project was executed.**

- **Costs and benefits, as well as experience, were not evaluated even though this was a pilot project on the results of which computerisation in other Air Force units was to be taken up.**

- **The running of an EDP system in parallel with a manual system for three years will adversely affect the economics of the project.**

7.04 Planning

The planning process for an EDP system of this kind should cater to the detailed identification of needs and objectives, adequate recognition of staffing and other resource requirements, the laying down of operational objectives and milestones and the clear definition of priorities. In response to an enquiry relating to the availability of an overall EDP strategic plan, Air HQ stated that a letter of August 18, 1977 to HQ Maintenance Command (Command) constituted the strategic plan. This letter, however, merely proposed that a feasibility study be conducted to evaluate the usefulness and cost effectiveness of the system proposed by a public sector undertaking (PSU) for automating ED procedures. In effect, therefore, there was no EDP strategic plan. Further, Air HQ did not have a set of policy objectives within the framework of which an EDP strategic plan could have been evolved. Air HQ, however, maintained that the strategic plan is in accordance with the overall policy and objectives for the Indian Air Force (IAF) as laid down in the charter of duties for the Director of Data Processing (DDP) at Air HQ.

The Ministry, while accepting (September 1988) the need for a comprehensive

planning process as indicated above, stated that "the policy had to be flexible enough to incorporate any meaningful changes" which may be necessary subsequently. It further stated that although the strategic plan has its origin in the formation of the Directorate of Data Processing, the relevant records were not available.

The main recommendations of the feasibility study were:

- Computerisation of the ED with a particular computer manufactured by a PSU was feasible, useful and cost effective.
- A project team with a specified strength be appointed for a period of 18 months to undertake systems analysis and design prior to installing the computer.
- The construction of site, installation of computer and finalisation of systems analysis and design tasks must follow a predetermined network.

7.05 Hardware acquisition

While the main recommendations of the feasibility study were based on the installation of a particular computer system costing Rs.41.45 lakhs manufactured by a PSU, the system finally installed was entirely different and was imported at a cost of Rs.45 lakhs in free foreign exchange (FFE) in 1983. The Government letter of 17 August 1979 had specified that the purchase of the computer for the ED was to be arranged through the Department of Electronics (DOE) and that the compatibility of the system with the system existing at Air HQ was to be ensured. Delay on the part of DOE in processing the ED's requirement led Air HQ to club the procurement with that of the new system being procured for the Air HQ Computer Centre. This was accepted by DOE and, in July 1981, an evaluation committee shortlisted four offers of firms A, B, C and D for technical presentation and price negotiations. The PSU's offer, was elimi-

nated, *inter alia*, on the ground that its equipment was not compatible with the Air HQ computer system. It was, however, seen that the equipment finally imported was also not fully compatible since programs developed on the Air HQ computer system could not be run on the ED's system without modifications. Further, data transfer on teleprinter channels between the two systems was not possible. On the other hand, the PSU had stated in its quotation of May 1980 that it would not be difficult to connect the system offered by it to any host system to be installed at Air HQ by developing, in a short time, the necessary software interface.

The feasibility study had indicated that the PSU's equipment could handle 2.25 lakh depot items. In contrast, the equipment installed at the ED was not capable of handling more than one lakh items. Even this capability was achieved by an additional investment of Rs. 10 lakhs in FFE when additional hardware was procured in 1987. The Ministry maintained in September 1988 that out of 2.5 lakh items held in the ED, only 1.25 lakh items merited computerisation and that it was not cost effective to computerise inactive and obsolete ranges. However, no revised cost-benefit studies were conducted as a result of changes in equipment acquired. The Ministry stated that the available hardware (including additional hardware) is adequate for about 1.5 lakh active items. The problem of hardware adequacy is accentuated by the need to hold all transactions on disks due to non-cessation of the parallel run. Discontinuation of the parallel run would help in relieving disk space greatly. However, it was noticed that the present hardware capacity which caters to 1.5 lakh active items is already in excess of 1.25 lakh items which the Ministry stated merited computerisation. The surplus capacity will only increase once the parallel run is discontinued and will further affect the economics of the project.

7.06 Systems analysis and design

Based on a recommendation of the feasibility study, the Ministry sanctioned the creation of a project team in September 1981 for a period of 18 months to undertake systems analysis and design work. The staff complement of the team was short of that recommended by the feasibility study which was partly responsible for the delay in the completion of this work. The Ministry stated that trained staff was provided within the constraints of manpower availability. However, the Command had pointed out to Air HQ in August 1983 that work on collection of master data by drawing personnel from various sections of the ED was adversely affecting its performance. The feasibility study had recommended that systems analysis and design should be completed before installing the computer. However, this did not happen and the work was completed in July 1984 although the system had been installed by September 1983. Although the Ministry have now stated that systems design was machine dependant and had to wait until the system was installed, the project PERT chart shows that systems design was to be completed in parallel with the installation of the machine. In fact, it had been pointed out by the Command in August 1983 that the posting of additional officers would expedite completion of systems design. Better planning and the timely availability of staff could have assisted in completing the task on schedule.

7.07 Project implementation

The formation of an EDP centre at the ED was formally sanctioned by the Ministry in August 1983 "to carry out the tasks relating to the computerisation of the ED complex". The tasks, however, were not amplified by either the Ministry or Air HQ. The Ministry stated that the tasks were presumed to have been understood by all concerned and that it was not necessary to spell out the charter of duties. It agreed, however,

that the approach to be adopted for software development had not been clarified. Consequently, there were delays in the implementation of the project. The computer was installed in September 1983 and taken over by the users in November 1983. Thereafter, systems design was completed in July 1984 and programme development in September 1985 as opposed to September 1983 and April 1984, respectively, as indicated in the PERT chart. The fact that the tasks were not clearly defined led to the development of different perceptions in respect of the software development programme between the ED and Air HQ. The ED believed that the complexity and the number of programs were not dependent on the volume of data or size of the inventory to be computerised, but on the number of activities and their complexity. Air HQ, on the other hand, maintained that utilisation of the components could be commenced by taking up a small weapon system. The Ministry stated that the programming effort for such a task could not be accurately anticipated. Had the tasks been clearly defined at the initial stages and an operational plan formulated, the programming effort could have been estimated more accurately.

Software development was undertaken internally at the ED. It is an expensive process and needs to be continuously evaluated to minimise costs and remain within time parameters. Although the Ministry agreed with this, it was unable to provide information on the planned and actual costs of software development.

7.08 Review arrangements

A steering committee chaired by the Deputy Chief of Air Staff was constituted in April 1978 to provide high level policy direction to the progress of computerisation in the Air Force. Although required to meet at least thrice a year, it met on five occasions until June 1980 when it was disbanded. It was set up again in January 1985. It has met

infrequently thereafter. The system of sending monthly progress reports to Air HQ prior to this date was obviously not effective since delays continued to occur. The delay aspect was recognised in the first meeting of the new steering committee in February 1985. Evidence of inadequate monitoring is provided by the direction of the steering committee chairman in September 1987 where the DDP was advised to draw up a plan for monitoring all activities.

7.09 Cost benefit analysis.

The feasibility study had concluded that, apart from the qualitative benefits, there would be savings to the extent of Rs.28.8 lakhs after seven years of operating the computerised system and that the break-even period would be four years from computerisation. The benefits, as well as the costs, have not been evaluated thereafter in the light of actual operations. There is, therefore, no means by which benefits versus costs of the existing system can be termed as showing a positive trend. This is particularly so in the context of deviations made from certain important assumptions upon which the original analysis had depended. For instance, while the original study assumed a parallel manual operation of six months, the manual system had not been discontinued till October 1988. Further, while the computer system of a PSU was taken into account originally, the costs and benefits of the hardware actually installed would be entirely different. The Ministry, however, stated that a change in hardware does not affect cost-benefit analysis which is the result per se of computerisation. It added, nevertheless, that savings would be evaluated only in 1990.

7.10 Parallel manual operation

In January 1986, the Controller of Defence Accounts (Air Force) (CDA (AF)) had approved a proposal of the ED to have the manual system run in parallel to the computerised system for a six month period

subject to certain conditions. This run has continued well beyond the six months originally envisaged. It was stated by the Controller General of Defence Accounts (CGDA) in May 1988 that the computer based system was being studied by his organisation with a view to satisfying itself that audit would be foolproof. The Ministry stated that the system being developed followed an entirely new methodology and, consequently, the process of working out how such a system was to be audited involved detailed education and planning which was time consuming. A team formed to develop software for audit is targetted to complete its job by early 1989 and only after the discrepancies between the manual and computer outputs are reconciled and audit through computer established, could the parallel run be dispensed with. As regards the extra expenditure due to non-cessation of the parallel run, the Ministry argued that since the sanctioned establishment of the computer centre had not been augmented, no extra expenditure was involved. This view is, however, not tenable as the cost of manpower deployed for store accounting in the stock holding sites has been ignored. Even otherwise, inventory management by independent manual and electro-mechanical processes simultaneously over extended periods is not economical. Further, since a decision to computerise the ED's functions was taken as early as in 1979, association of internal audit with system analysis and design could have obviated a large part of the delay in developing an appropriate audit methodology and switching off the manual system.

Air HQ were unable to indicate whether the conditions subject to which the parallel run had originally been approved by the CDA(AF) had been met or not. While Air HQ were, on the one hand, pressing the CGDA to discontinue the manual system at an early date, they were, on the other hand, expressing doubts on the cessation of the parallel run. The Ministry, however,

maintained that internal audit cannot give clearance for change of procedure subject to any conditions.

The ED had indicated in August 1986 that before considering the discontinuation of the parallel run, three major aspects should be considered. These were an uninterrupted power supply (UPS) system, the holding of critical spares at the depot itself and the availability of a standby microcomputer system. The Ministry stated that action to arrange for a UPS was in progress, provisioning of critical spares was in hand and once the UPS was available, the standby microcomputer system would not be necessary. It agreed that it needed to take these factors into account as well as the cost of the extended parallel run at an early stage.

7.11 Spares

Although a spares holding policy was prescribed by Air HQ in July 1986 and accepted by the ED as meeting its requirements fully, there was delay in implementing the policy. The Ministry attributed the delay in procurement of spares to the manufacturer undergoing reorganisation between 1985 and 1986 and stated that the procedure for supply of spares was streamlined in 1987 and that there was improvement in the supply status. Spares holding at the ED had, however, been inadequate for a period of four years since installation of the computer in August 1983 and the ED had continued to remain dependant on the manufacturer for the supply of critical and other spares. In reply to a query as to why this critical aspect was not taken care of at the stage when the hardware was contracted for in 1982, the Ministry stated that the responsibility to supply the spares was with the manufacturer and the delay was due to their internal problems. Again, in regard to the failures in power supply (1093 failures representing 574 hours downtime from January 1984 to August 1986), the Ministry said that it had gone by the manufacturer's recommendation that a UPS

was not necessary. It was seen, however, that the manufacturer had made no positive recommendation but left it to the users to take a decision. The Ministry added that it had not assessed the costs of computer downtime.

7.12 Operation and control

Computer Centre controls, including system documentation, librarian procedures and production schedules were evaluated and found to be satisfactory. In addition, adequate back-up and recovery procedures exist for the system. However, there was no system of formal reporting of operational problems, except through the monthly progress reports. This was accepted by the Ministry. In reply to a query seeking information in regard to the types of problems that occurred including the measures taken to reduce the frequency of occurrence or the elimination of the problems altogether, the Ministry could only give details of records maintained locally at the ED. No information was available with the monitoring agencies. In regard to software maintenance procedures, neither the ED nor the Ministry was able to indicate the manner in which software development, updating and other revisions were undertaken except to state that this was done by way of experience and user interaction.

7.13 Additional hardware

In December 1986, the ED had projected a requirement for additional hardware. The Ministry stated that this requirement was felt only in view of additional tasks undertaken for optimising the system developed. It provided no details of the additional tasks. This position, however, is not tenable in view of the limited capability of the initially acquired hardware compared to the system recommended in the feasibility study. Also, while the feasibility study had assumed an equipment life of seven years, the ED is currently working on the assumption of a five year life span. The Ministry

attributed the reduction of life span to the change in the system. It appears, however, that the hardware requirements were not correctly assessed initially.

7.14 Demand satisfaction

The ED clarified that an increase in demand satisfaction from 50.3 per cent in 1985-86 to 66.5 per cent in 1987-88 was a measure of improvements effected by introducing computerisation. There was no evidence, however, to show the extent to which this increase in satisfaction could be directly related to computerisation and at what costs. The Ministry stated that since there had been no changes in policies or procedures, the increase in the satisfaction rate was attributable entirely to computerisation. This view, however, would require to be considered in the context of the fact that no detailed cost benefit evaluation has been made after the operation of the computer system.

TRAINING

8. Procurement of unsuitable gliders

Glider training in the National Cadet Corps (NCC) and at the National Defence Academy (NDA) was being seriously affected since 1977-78 on account of the dwindling assets of gliders. Based on an Air Staff Requirement (ASR) of the Air Headquarters (HQ), an improved two seater Ardhra glider (glider) was designed and developed by the Director General of Civil Aviation. A prototype was test flown and type certified in November 1979. The Ministry of Defence (Ministry) got the gliders evaluated in terms of the ASR and it was considered suitable with certain improvements for induction in NCC squadrons.

Based on a request, Hindustan Aeronautics Limited (HAL) confirmed in September 1980 that it was feasible to manufacture the glider and that a production of 200 gliders would be economical. The unit cost

would be Rs.2.13 lakhs. It was also added that tooling efforts to the extent of Rs.36.50 lakhs and capital expenditure of Rs.4 lakhs would require to be reimbursed to HAL.

It was decided in October 1980 that an interim order of 50 gliders be placed on HAL and that further orders would follow when the total requirement of the NCC had been clearly established. An order was placed on HAL by Air HQ in March 1981 for the manufacture and supply of 50 gliders at an estimated cost of Rs.2.10 lakhs per glider. A further order was placed on HAL in December 1983 increasing the total quantity ordered from 50 to 57 gliders to be delivered in 1982-83 (5), 1983-84 (20), 1984-85 (25) and 1985-86 (7). This schedule was, however, not adhered to and only 16 gliders were delivered during 1983-84. Deliveries were completed in 1986-87.

Apart from slippages in the delivery schedule, the gliders received during 1983-84 had 10 defects, of which three were major ones. Consequently, solo flying on these gliders was suspended. The problems associated with these defects were discussed in a meeting held in October 1984 and possibilities of fore-closing the project considered as it was observed that the glider was of a very old design. A number of modifications in the design of the glider were carried out by HAL subsequently and the modified gliders were accepted after flight evaluation.

The production of modified gliders continued and 16 gliders delivered during 1983-84 were retro-modified by incurring an additional expenditure of Rs.3.20 lakhs.

An amount of Rs.173.55 lakhs was reimbursed to HAL towards the cost of 57 gliders including profit. Besides, final payment of Rs.53.87 lakhs was also authorised to HAL in June 1987 towards the creation of production facilities. No further order on HAL was placed and the project has been foreclosed. This has resulted in an increase in the cost of production and redundancy in

tooling and material amounting to Rs.24.03 lakhs.

Of the 50 gliders delivered to user units, two gliders are yet to be inducted and 16 gliders, though inducted, are yet to take their maiden launch. The performance of the remaining 32 gliders was much below the authorised task. As against the authorised task of 1000 launches per glider per year, only six gliders had achieved 50 to 100 per cent of the task. The task achieved by seven gliders ranged between 20 to 50 percent and that by 19 gliders was below 20 percent. As against 11 non-flying squadrons to be converted into flying squadrons in the first phase, only five squadrons could be converted due to non-availability of gliders.

The Ministry stated in September 1988 that the gliders have not been performing satisfactorily and that the main reasons for their under utilisation were :

- Non-availability of gliding instructors,
- Non-availability of gliding strips,
- Un-serviceability of gliders and winches,
- Bad weather conditions and non-availability of funds.

The Ministry further stated that of the proposed 11 squadrons, it has been possible to convert only five squadrons.

In summary, none of the objectives of the project initiated in 1979 had been met despite an investment of Rs.2.27 crores. Glider training at the NDA and in the NCC continued to be inadequate. The NCC's expansion programme was only partly fulfilled. Government have not inquired into the events that led to an unproductive investment in developing air mindedness in the youth of the country.

9. Procurement of a training simulator

Modern training techniques employ the use of simulators for the combat training of pilots as imparting such training by actual

flying is expensive and risky. With a view to improving such training and achieving economies in flying efforts, Air Headquarters (HQ) submitted a proposal in July 1982 to acquire an air combat simulator. The proposal indicated that the introduction of a simulator would increase the productivity of training missions and enhance flight safety. In February 1984, Government approved the proposal for procurement of a simulator for Rs.15 crores and the constitution of a negotiating committee.

Air HQ finalised the operational requirement (OR) of the simulator and, based on the OR, a global tender was floated by the Ministry of Defence (Ministry) in June 1984. In response, offers were received from four foreign firms 'A', 'B', 'C' and 'D'. The rates quoted were Rs.14.08 crores by firm 'A', Rs.13.01 crores by firm 'B', Rs.15.46 crores by firm 'C' and Rs.20.38 crores by firm 'D'.

Air HQ constituted a technical committee to evaluate the offers. The committee evaluated the offers and submitted its report in December 1984. The technical committee concluded that the offers of firms 'A' and 'D' did not adequately meet the ORs. The committee also said that information contained in the technical proposals was not complete. It, therefore, issued a questionnaire seeking additional information to judge the suitability of the proposals. The technical committee recommended after studying the clarifications that the offers of firms 'A' and 'D' being technically inferior need not be considered further and technical discussions followed by commercial negotiations be conducted with firms 'B' and 'C'.

In February 1985, the Ministry constituted a negotiating committee. The report of the technical committee, their recommendations and also the financial aspects of the proposals were considered by the negotiating committee in March 1985. The committee decided that the offer of firm 'D' being the most expensive and technically

inferior need not be considered further. The committee also decided that representatives of the remaining three firms be called for technical discussions before commercial negotiations commenced.

Technical discussions with these firms were held in April 1985 at Air HQ and the firms were requested to recast their proposals. The revised proposals were received by July 1985. On evaluating the revised proposals, the technical committee submitted its supplementary report. The negotiating committee in its meeting of October 1985 decided that all the three firms be asked to give a detailed presentation highlighting the main features of their proposals and equipment to permit the negotiating committee to compare the proposals on a like to like basis.

These presentations were held in January 1986 and attended by both the technical and negotiating committees. Following these presentations and extensive technical discussions with the firms, Air HQ reassessed the required parameters of the simulator in keeping with the current state of the art in the field. Certain requirements were dropped from the OR as they were not available on the basis of existing technology. The revised OR was approved in April 1986. Thereafter, firms 'A', 'B' and 'C' were asked to quote on the basis of the revised OR. This was done even though Air HQ had clarified that the nature of changes made in the OR did not warrant obtaining fresh proposals from the competitors. The rates quoted were Rs.13.8 crores by firm 'A', Rs.22.5 crores by firm 'B' and Rs.30.12 crores by firm 'C'. During subsequent negotiations, while firm 'A' reduced the cost of its offer by a negligible amount, firm 'B' reduced the cost of its offer considerably from Rs.22.5 crores to Rs.14.78 crores with an offer of 100 percent counter trade. Firm 'C' did not reduce its offer.

The technical committee evaluated the revised proposals in terms of the revised

OR and submitted its report in January 1987. The committee viewed that though the offers of all the three firms were acceptable, firms 'A' and 'B' were the main competitors as firm 'C' had quoted exorbitantly high rates. The technical committee, however, rated the offer of firm 'B' higher, compared to firm 'A' in terms of growth potential, performance and efficiency as indicated below briefly:

- while firm 'B' had offered to associate Indian Air Force engineers during the development phase and to train them in hardware as well as in software development as an option, firm 'A' had not offered any such training;
- while firm 'A' had offered technical assistance for a period of 12 months after installation of the simulator, firm 'B' had offered such assistance for a period of 20 months;
- the offer of firm 'A' provided growth potential for expansion upto three domes with the existing computer. For adding the 4th dome, the computer would require an additional processor and associated software. In contrast, the offer of firm 'B' provided growth potential for expansion upto four domes;
- firm 'B' could generate software for 16 aircraft models, firm 'A' had promised only three aircraft models;
- the dome of Firm 'B's equipment was made of solid material which was technically superior to the dome offered by Firm 'A' which was made of inflatable synthetic material;
- firm 'A' had provided four additional facilities under option whereas firm 'B' had provided nine options;
- the offer of firm 'B' had 20 advantages and only one disadvantage whereas the offer of firm 'A' had eight advantages and seven disadvantages.

The technical committee recommended that firms 'A', 'B' and 'C' be called for commercial negotiations. The final offers from firms 'A', 'B' and 'C' were received in March 1987. The final costs of the offers of firms 'A' and 'B' after negotiation were:

Firm 'A' - Rs.15.01 crores.

Firm 'B' - Rs.14.39 crores.

The offer of firm 'C' was not negotiated being exorbitantly high. The negotiating committee, in its meeting held on 9th April 1987 decided to consider the offer of firm 'B' for acceptance. Accordingly, firms 'A' and 'C' were informed in writing on 9th April 1987 that their offers had been rejected. Firm 'B' was called by the Ministry for finalising the contract clauses.

In an unusual development on 10th April 1987, firm 'A' wrote to the Ministry reducing the cost of its offer by Rs.1.86 crores. Though this letter of firm 'A' was received after its offer had been rejected by Government, the negotiating committee decided to consider it. Both firms were again requested to submit their 'final' quotations. The final quotations received in May 1987 were as follows:

Firm 'A' - Rs.12.43 crores

Firm 'B' - Rs.14.25 crores.

Based on the final quotations, the negotiating committee approved the offer of firm 'A'. Accordingly, a contract for the procurement of a simulator at a cost of Rs.12.43 crores in free foreign exchange (FFE) from firm 'A' was concluded in July 1987. The simulator is scheduled to be delivered to the Indian Air Force by January 1990.

The Ministry stated in September 1988 that correct procedures were followed at all stages from technical evaluation to award of contract. It added that, during discussion, firm 'A' agreed to provide some of the facilities at extra cost. It was noticed, however, that the extra cost of an additional

processor and its associated software required for operating upto four domes was Rs.56.98 lakhs. Obviously, the economic costs of the facilities provided by Firm 'B' had not been evaluated.

The case provides evidence of defective procurement procedures having been employed in the acquisition of a crucial, technology intensive training equipment. A firm whose initial offer was considered technically unacceptable was invited for further technical and commercial discussions on the basis of revised OR even though Air HQ had advised that this was not necessary. The simulators offered by the three firms were not physically evaluated even though the Technical Committee had considered this necessary. No effort was made to evaluate the technological superiority of Firm 'B's offer in economic terms. As a result, the decision on the final price offers was vitiated and the question of acquiring a simulator that provides value for money placed in doubt.

10. Delay in development and fabrication of aircraft simulators

Paragraph 6 of the Report of the Comptroller and Auditor General of India, Union Government (Defence Services) for 1978-79 referred to the acceptance after development of aircraft 'A' by the Air Force in 1978 after relaxing certain important operational parameters. Poor serviceability and a changed threat environment led to the Ministry of Defence (Ministry) deciding in December 1979 to phase out the aircraft from 1985. Earlier, aircraft 'B' was progressively inducted into the Air Force from 1968 onwards. Mark II of aircraft 'B' was sanctioned for development in December 1975 and the aircraft was inducted into service from December 1985.

A requirement for training simulators for both aircraft 'A' and 'B' (simulators 'A' and 'B') was projected by Air Headquarters (HQ) in October 1975 and July 1975

respectively. To meet this requirement through indigenous development, a Research and Development Establishment (RDE) submitted a proposal in August 1976. This was sanctioned by the Ministry in June 1977 at an estimated cost of Rs.6.47 crores. The sanction specified that the simulators 'A' and 'B' were to be delivered to the Air Force by December 1981 and August 1982 respectively.

Thereafter, the RDE entered into a technical consultancy agreement with a foreign firm which was operative from April 1980 for three years at a cost of Rs.8.22 lakhs. The conclusion of the consultancy agreement notwithstanding, there was an abnormal delay in the development of the simulators. The delay resulted in the revision of the delivery date to February 1986 for both simulators. The estimated cost of the project was also revised in April 1986 to Rs.8.28 crores.

Simulator 'A' was moved to a station in September 1985 and its installation was completed in December 1985. However, due to problems relating to poor airconditioning and a defective computer system, the simulator was not taken over by the users. The defects in the computer system were rectified in February 1988. It was taken over by the users in April 1988. Thus, the simulator for aircraft 'A' inducted into service in 1978, had not become functional till April 1988. Meanwhile, the first squadron of aircraft 'A' itself was phased out from July 1987 onwards and the entire fleet would be phased out by 1991. The investment clearly, was largely infructuous and sub-optimal. Air HQ confirmed in April 1988 that the quality of training would be at the lowest acceptable limit and the quality of training to effort ratio would be poor. Additionally, in terms of costs, Air HQ stated that the absence of the simulator led to training being imparted by utilising air effort which could have been used for other exercises, thereby producing a better trained pilot.

Simulator 'B' was installed in May 1986. However, it could not be taken over by the users on account of certain technical problems until February 1988. Thus, a training simulator for an aircraft inducted from 1968 onwards, was available for training only from February 1988.

The RDE had incurred an expenditure of Rs.783 lakhs including a foreign exchange element of Rs.326.5 lakhs upto March 1987 for the development of the simulators. In addition, civil works at both the stations cost Rs.170.28 lakhs.

The delay in development of the simulators was attributed by the Ministry to the non-availability of a digital computer from indigenous sources, delay in recruitment of manpower, modifications desired by the user and non-availability of the full range of validated and adequate data necessitating considerable iterative studies. The Ministry also stated in September 1988 that non-availability of a simulator for 10 years after aircraft 'A' was inducted into service till its phasing out commenced in July 1987, resulted in no simulator training being imparted during the period. It stated further that though aircraft 'B' was inducted in 1968, an ASR for the simulator 'B' was issued only in November 1975, when technology became available, and that it would not be proper to measure the availability of simulator against induction of the aircraft.

The case reveals a serious mismatch between the induction of aircraft and the commissioning of related training simulators. While aircraft 'A' was inducted in 1978 and was being phased out from 1987 onwards, the simulator had not become functional till April 1988. In the case of aircraft 'B', the simulator was provided 19 years after the induction of the aircraft.

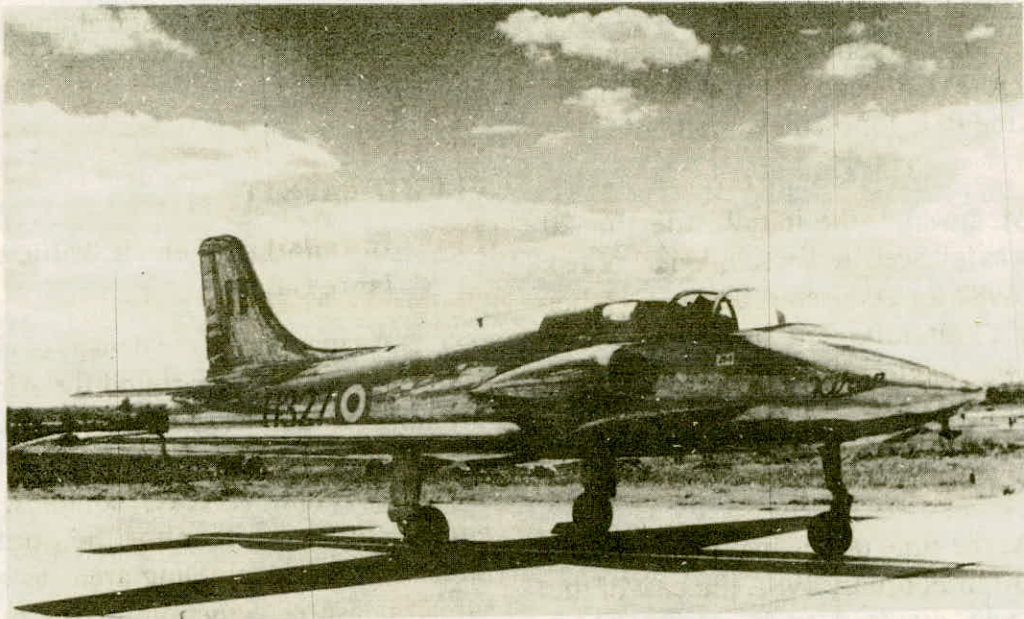
The implications in terms of cost effective training and the slowing down of the pace and quality of training of operational pilots flying these aircraft are serious

enough to warrant a thorough investigation and the prescription of guidelines to insulate air defence training from compromises of this kind in future.

11. Development of a trainer aircraft

The Kiran aircraft, fitted with an imported engine, was being used by the Air Force for basic jet training since 1968. Based on a feasibility study by a Public Sector Undertaking (PSU), Air Headquarters (HQ)

proposed in July 1975 that the aircraft be re-equipped with a modified indigenous engine. The proposal maintained that apart from being economically viable, the modification would result in a saving of Rs.5.5 crores. The modified aircraft (Kiran Mk II) was expected to be in the same class as modern basic jet trainers and be capable of being used for limited support and counter insurgency as well.



Kiran Jet Trainer Aircraft

Based on this proposal, the Ministry of Defence (Ministry) sanctioned in December 1975 the development of the Kiran Mk II aircraft by the PSU at a cost of Rs.2.08 crores (foreign exchange : Rs.20 lakhs) which was increased to Rs.3.82 crores in May 1982. The Ministry also sanctioned in March 1976 the placement of an order for 89 aircraft on the PSU.

The sanction was followed by the finalisation of an Air Staff Requirement (ASR) in August 1976 which laid down the performance parameters for the Kiran Mk II aircraft. It was programmed to fly the first prototype within one year from the date of the sanction and the second prototype was due to be ready a year thereafter leading to the complete development of the aircraft at

the end of three years. The work commenced by the PSU in August 1975 was scheduled to be completed by September 1978. The first prototype was flown in July 1976 followed by the second prototype in February 1979. The prototype fell drastically short of its expected performance not only in its operational role but in the basic training role as well. It had deficiencies in respect of most performance parameters. On account of these performance shortfalls, the Ministry, on the advice of Air HQ, reduced, in February 1981, the requirement to 20 aircraft instead of 89 sanctioned earlier.

In June 1981, Air HQ further reviewed the performance of the aircraft under development and decided to divest it of its operational role and to accept it for train-

ing alone even though it did not meet the ASR in several respects. This was reportedly done in the interests of indigenous development and production. The development works were finally closed in 1984. The Ministry stated in October 1988 that the armed and counter insurgency roles of the aircraft were met by stretching the resources of operational aircraft of the IAF fleet.

The project cost was revised in November 1984 to Rs.6.65 crores against the initial sanctioned cost of Rs.2.08 crores. However, an expenditure amounting to Rs.8.56 crores had been incurred upto March 1986 by the PSU for the development of the aircraft.

Meanwhile, the initial order for 20 aircraft was followed by two subsequent orders in June 1982 for 20 aircraft and in October 1983 for 13 aircraft. The newly developed aircraft was inducted in service in January 1986. Upto March 1987, 37 aircraft have been delivered against the order for 53 aircraft.

At the time of placing the order for 20 aircraft in February 1981, the cost of the aircraft was assessed to be Rs.94 lakhs. However, its cost in 1986-87 was Rs.165.35 lakhs.

The proposal to develop Kiran Mk II aircraft was to meet the increased training needs of pilots. However, the aircraft inducted into service was being used for training only flying instructors. The aircraft was not utilised for basic training of pilots as a viable number of aircraft were not available.

Thus, apart from the six year delay that occurred in the development programme, which led to the Air Force paying Rs.165.35 lakhs per aircraft instead of Rs.94 lakhs originally envisaged, the users had to accept an aircraft which fell materially short of performance parameters specified by them. Consequently, it could be used for only limited basic jet training and training of flying instructors. The time overrun had also re-

sulted in the denial of expected savings of Rs.5.5 crores.

The Ministry stated in October 1988 that success has been achieved in re-engineing the aircraft and in meeting its primary role of a trainer. However, since the aircraft could not meet the ASR in several respects, attempts to enhance its potential for meeting the support and counter insurgency role could not succeed. It also stated that if the aircraft had been developed in time, additional benefits in the flight training of pilots would have accrued.

FLIGHT SAFETY

12. Installation of an air traffic surveillance radar

An increase in the density of civil and military flying in and around the Air Force Training Academy (Academy) necessitated the urgent provisioning of an Air Traffic Surveillance Radar (ATSR) complex. This equipment was to monitor the position of aircraft in the local flying areas as a flight safety measure. Sanction for the procurement and installation of two sets of ATSR was accorded by Government in May 1977 and an Air Staff Requirement (ASR) formulated in December 1978. The ASR stated that the equipment be installed by 1979 and, in case of delay, the requirement be met by import.

In 1979, an offer of Hindustan Aeronautics Limited (HAL) to instal the equipment on a turn key basis was considered. Government's approval to the procurement of necessary equipment from HAL at a cost not exceeding Rs.5.6 crores was accorded in April 1980. The works services costing Rs.61.5 lakhs were sanctioned separately. The fact that the ASR had indicated the need to instal the equipment by 1979 was, evidently, either lost sight of or ignored.

A fixed cost quotation was submitted

by HAL in October 1982 for the supply of the equipment at a cost of Rs.598.56 lakhs including civil works worth Rs.61.59 lakhs. HAL stated that the project would be completed within 18 months from the date of signing of the contract.

A Price Negotiating Committee accepted the offer of HAL in January 1983. An indent was placed by Air Headquarters (HQ) in May 1983 for the supply of the equipment by April 1984 at a total cost of Rs.536.97 lakhs. Subsequently, in May 1985, it was decided to entrust the civil works also to HAL on a cost plus basis.

The ATSR was accepted in August 1984 pending the completion of civil works even though it was revealed during trials in December 1981 and January 1982, that the coverage of the radar was 20 per cent less than that specified in the operational requirements. As the work services were not completed, HAL was allowed to store the equipment till March 1985 in order to effect advance payment to it. Although Government accorded sanction in September 1985 for an 'on account' payment of Rs.320.62 lakhs, a sum of Rs.431.49 lakhs had already been paid in November 1984. The excess payment was recovered later during February 1986 and April 1986. The Ministry of Defence (Ministry) stated in September 1988 that this financial irregularity which led to the unauthorised locking up of Government funds was being looked into.

The works services were completed in September 1985 at a cost of Rs.61.50 lakhs. However, the ATSR had not been taken over (September 1988) due to problems encountered in the radar system. Meanwhile, a signal unit had been provided from within the operational resources of the Air Force to meet the requirements of the Academy. Air HQ stated in April 1988 that this caused depletion in the operational resources of the IAF during emergencies. The Ministry confirmed (September 1988)

that vital depletion of operational resources would occur only during emergencies. It also stated that the installation of the ATSR was completed in March 1986 but performance evaluation and calibration could not be completed due to certain snags. The question of delay and its impact were being looked into by the Ministry.

The case reveals that:

- a vital flight safety equipment has not been commissioned at the Academy even after 10 years of its sanction resulting in the avoidable depletion of the operational resources of the Air Force during emergencies as well as constituting an avoidable flight safety hazard.
- funds to the extent of Rs.5.98 crores had been locked up for extended periods.

13. Procurement of navigation equipment for VVIP flights

In order to provide reliable navigation facilities at remote helipads for the safe operation of VVIP flights, the Ministry of Defence (Ministry) sanctioned in September 1979, the procurement of 10 sets of a portable navigation equipment (equipment). Clearance for import of the equipment was given by the Department of Electronics (DOE) in August 1981 since no indigenous equipment conforming to the specification was available. The parameters for the equipment were finalised and global quotations invited in November 1981. However, in July 1982, the requirement for the equipment had increased from 10 to 68 sets.

In response to the global invitation in November 1981, offers were received from three foreign firms 'A', 'B' and 'C'. The rate quoted by firm 'A' was the lowest at Rs.1.42 lakhs per set. The second lowest rate quoted was that by firm 'B' at Rs.1.92 lakhs per set. A technical committee evaluated the three offers and recommended that the equipment offered by the three firms met the basic requirements and noted that

none of the offers was meeting all the qualitative requirements. Based on the recommendations of the technical committee, a negotiating committee had recommended procurement of the equipment from firm 'A'. Accordingly, approval of the Ministry was obtained in September 1982 to the placement of an order on firm 'A' for the supply of 68 sets of the equipment with spares at a total estimated cost of Rs.1.07 crores in free foreign exchange (FFE). Thereafter, the negotiating committee finalised the terms of the contract with firm 'A' which included their acceptance of the need to undertake indigenous licence production of the equipment to meet requirements of the Air Force (IAF) beyond 68 sets.

Shortly before the finalisation of an agreement with firm 'A', Air HQ, who had participated in the technical evaluation as well as in negotiations for the finalisation of the terms of the contract with firm 'A', expressed their apprehension about the efficiency of the equipment in terms of its size, volume and weight not being compatible with the space available in a helicopter. Thereafter, Air HQ suggested, in March 1983, that possibilities of procuring the equipment from indigenous sources be explored. Consequently, the operational parameters were revised by Air HQ and fresh tenders were invited domestically in June 1983.

Offers were received from a State Government Undertaking (SGU) and a Public Sector Undertaking (PSU) in July 1983. The offer of the SGU was found suitable by the technical committee. The committee, therefore, recommended (December 1983) the procurement of the equipment offered by the SGU subject to satisfactory field trials. The SGU had quoted Rs.2.48 lakhs per set.

The SGU imported one set of the equipment offered earlier by firm 'B' and supplied it to the IAF (May 1984) for trials.

The trials had certain limitations due to design problems in the indigenous antenna. The equipment, however, could not be tested in the required environment as it had to be re-exported due to expiry of customs permit.

As the non-availability of the equipment had affected the operational efficiency of the IAF, Air HQ proposed, in July 1985, the procurement of 20 sets of the equipment with a contractual provision to raise the quantity to 68 sets. It was proposed (September 1985) to import four sets and get the remaining 16 sets through progressive indigenous production.

Since the offer of the SGU had not been accepted within the extended validity period upto June 1984, the SGU revised its rate in August 1985 from Rs.2.48 lakhs to Rs.3.32 lakhs per set. A letter of intent was issued to the SGU in September 1985 and a contract with the SGU was concluded in February 1986 for the procurement of 20 sets of the equipment with spares at a total cost of Rs.97.12 lakhs.

The delivery of the equipment was to have been completed by November 1986. However, the delivery commenced in March 1987 and was completed by December 1987. The trials of the equipment in the requisite environment, which were required to be conducted before placing the order, had not been completed till March 1988. The Ministry stated in August 1988 that in the event of unsatisfactory performance of the equipment in the post contract trials the SGU would be required to pay 105 per cent of the amount paid by the Government for the cancelled part of the contract. However, while monetary compensation would, doubtless, be available to Government, the Air Force would be deprived of operationally needed equipment in the event that performance standards are not met during trials. Clearly, there was need to carry out the trials before concluding the contract.

The case reveals that though equip-

ment offered by firm 'A' was evaluated and found techno-economically acceptable, purchase was not progressed on grounds of size compatibility. Subsequently, the equipment of firm 'B' was purchased through a SGU at a higher rate entailing an avoidable expenditure of Rs.28 lakhs, when compared with firm 'B's offer of 1981 and a five year delay. The Air Force were left with a serious gap in operationally necessary equipment and the acceptance of 20 sets, as opposed to 68 originally indicated, revealed weaknesses in assessing requirements precisely.

The Ministry stated in August 1988 that the requirement of another 48 sets still exists, but an order could not be placed because it was planned to conduct further trials in the eastern sector to ascertain the working of the equipment in extreme weather conditions and difficult mountainous terrain. The Ministry added that, in the absence of the equipment, VVIP flights had to be operated with the utmost care and navigational caution imposing, thereby, avoidable stress and strain on the aircrew.

14. Procurement and installation of a radar system

A Ground Control Approach Radar System (GCA) comprises of a Precision Approach Radar (PAR) and Surveillance Radar Element (SRE). This system is vital for the safe launching of aircraft in adverse weather conditions and also for their recovery during low flying exercises. The manufacture and delivery of 16 sets each of PAR and SRE by Hindustan Aeronautics Limited (HAL) was commented upon in paragraph 39 of the Report of the Comptroller and Auditor General of India, Union Government (Defence Services), 1978-79. At that point of time (March 1979), HAL had supplied seven sets of SRE and 10 sets of PAR. Subsequent manufacture, delivery and installation at various airfields has been examined.

HAL supplied the remaining nine

sets of SRE and six sets of PAR between March 1979 and March 1983 after an abnormal delay of five years. This delay resulted in increased costs to the extent of Rs.10.8 crores (including 11 per cent as profit) which had to be reimbursed to HAL. The delay by HAL was compounded by a further delay on the part of the Air Force which resulted in four sets of GCA being installed during 1986 and 1987 after four years of their receipt. Air Headquarters (HQ) attributed the delay to the fact that works services for installation were incomplete for want of funds and the shifting of installation sites on account of technical reasons.

Meanwhile, Air HQ anticipated delay in supply by HAL and projected a case in July 1978 for the procurement of six additional GCA sets. This was approved by Government in January 1979 for operational and flight safety considerations. The procurement of four transportable sets by import and two sets from HAL on priority was sanctioned in February 1980. The imported sets which were contracted at a cost of Rs.11.75 crores (all in free foreign exchange) in March 1980, and scheduled to be delivered between September 1981 and March 1982, were installed and commissioned at various airfields between 1982 and 1985, due to delayed delivery of the equipment by the foreign firm for which liquidated damages are reported to have been recovered.

Government had sanctioned the procurement of two sets of GCA from HAL on priority in February 1980 even though HAL had slipped up on the earlier orders of March 1972 and December 1975. This notwithstanding, two more sets were ordered on HAL in January 1982 at a cost of Rs.5.78 crores. These four sets of GCA (ordered on HAL in February 1980 and January 1982) were required to be delivered between June 1982 and December 1983. In fact, only four sets of SRE and two sets of PAR valued at Rs.6.80 crores had been delivered by HAL as of July 1988 after a delay of 45 to 51

months. They have since been held in storage and are awaiting installation for want of civil works facilities. The remaining two sets of PAR are still under manufacture (July 1988)

It was also noticed that works services required for the installation of these radars were not synchronised to match with their delivery schedules. While such services at three airfields had not been sanctioned even in December 1987, works services at an airfield, sanctioned at a cost of Rs.57.40 lakhs in December 1983, had commenced only in February 1987 and were expected to be completed by July 1988. The Ministry of Defence stated in June 1988 that the delay in the installation and commissioning of the GCA had affected the flying training of pilots. It also stated that the project was now being closely monitored to prevent further delay.

Apart from the delays that occurred both in the manufacture and delivery of the equipment as well as in its installation and commissioning, the main objective of ensuring the safe launching and recovery of aircraft in adverse weather conditions and during low flying exercises seems to have been lost. Government should consider inquiring into this project in detail with a view to determining the reasons for unsatisfactory project management and fixing responsibility.

15. Procurement and utilisation of mechanical runway sweepers

A proposal was made by Air Headquarters (HQ) in January 1972 for the introduction of mechanical runway sweepers (MRS) at airfields in order to avoid accidents due to foreign object damage (FOD) to a large number of jet aircraft in operation with the Indian Air Force (IAF). There were 126 aircraft accidents due to FOD during the period 1968-72. While accepting the necessity in principle, the Ministry of Defence (Ministry) decided to explore the possibilities of developing the MRS indigenously.

After carrying out a detailed study, the Defence Research and Development Organisation recommended the procurement of MRS from firm 'A'. The Ministry accorded sanction in October 1973 for the purchase of two MRS for trials at a cost of Rs.7.25 lakhs including Rs.1.68 lakhs in free foreign exchange (FFE). These were, however, procured and positioned at an airfield in 1976 and 1977 and this delay in procurement was adversely commented upon by the Ministry of Finance.

Meanwhile, on the basis of a trial report of the International Airports Authority of India (IAAI), Air HQ initiated a proposal in August 1976 for the procurement, in a phased manner, of 108 MRS from firm 'A' for its 41 airfields at an estimated cost of Rs.4.30 crores including FFE of Rs.44.5 lakhs. In November 1976, Air HQ, however, reduced the quantity to be procured from firm 'A' to 19 MRS on account of financial constraints. Air HQ emphasised in December 1976 the urgent necessity of procurement of MRS due to an increased incidence of flying accidents due to FOD. 'The Committee on Flight Safety-March 1977' headed by the then Defence Secretary had also recommended the early procurement of MRS in view of the hazards of foreign objects being ingested by jet aircraft engines and the limitations of manual sweeping.

In August 1979, Air HQ reiterated the necessity of introducing the MRS urgently in larger numbers so as to prevent aircraft losses on account of FOD accidents which was estimated to be very high due to induction of sophisticated and high value aircraft. It was finally decided by the Ministry in December 1979 to procure 48 MRS in a phased manner from 1980-81 onwards at the rate of 12 per year.

Air HQ placed an indent on the Department of Defence Supplies (DDS) in April 1980 for the procurement of 48 MRS at an estimated cost of Rs.2.53 crores. However,

the DDS decided, in November 1980, to split the order on the plea to develop an alternate source of supply of a critical store and mitigate the monopolistic tendencies of a single supplier. Accordingly, orders on three firms viz. firm 'A' for 24 MRS (amount:Rs.86.10 lakhs), firm 'B' for 12 MRS (amount:Rs.36.60 lakhs) and firm 'C' for 12 MRS (amount:Rs.36.60 lakhs) were placed in April 1981. There were overall delays in the supply of MRS. The order of firm 'B' was cancelled in April 1987 since the Ministry did not accept the type of MRS offered by it.

Thus, out of 48 MRS to be provided at 33 airfields during the period 1980-81 to 1983-84, Air HQ could provide only 38 MRS at 26 airfields by December 1987. The delays and under provisioning had an adverse operational impact on the Air Force. During the period from April 1980 to March 1988 there were 144 aircraft accidents due to FOD. The value of the loss suffered was, however, not indicated by the Ministry. The average monthly rate of utilisation of 27 MRS ranged from 1.5 hours to 73.6 hours indicating considerable under utilisation. Only six MRS out of the 27 for which information was provided averaged more than 25 hours per month. The utilisation details of MRS inducted in February 1977 were not provided and three defective MRS were awaiting repairs in September 1988.

The Ministry stated in September 1988 that there was delay in the positioning of MRS at the airfields and such delays were not uncommon when a new equipment was introduced. It added that though FOD accidents cannot be eliminated with the introduction of MRS, the speedy clearance of the runway by the MRS can help to reduce FOD accidents.

The case provides evidence of poor procurement planning and implementation. The delays in the procurement of MRS, their unsatisfactory performance and under

utilisation need to be viewed in the context of the high cost of accidents in terms of material and highly skilled men. It would appear necessary that procedures for the procurement of critical flight safety equipment be reviewed to provide for greater efficiency alongwith a strong monitoring element.

PROVISIONING

16. Infertuous expenditure on procurement of parachute assembly

Mention was made in paragraph 43 of the Report of the Comptroller and Auditor General of India, Union Government, (Defence Services), 1985-86 regarding the premature withdrawal of Marut aircraft due to problems relating to an under powered engine.

Despite the fact that the phasing out of the aircraft was proposed by Air Headquarters (HQ) in May 1981, an indent was raised in July 1981 by Air HQ on the Supply Wing of an Indian Mission (SW) for the procurement of 10 parachute assemblies (parachute) for use in the aircraft at an estimated cost of Rs.2.77 lakhs to be delivered by January 1982. While seeking approval for the purchase, Air HQ had confirmed to the Ministry of Defence (Ministry) that these parachutes would be utilised before the aircraft was phased out in 1983-84

Due to an increase in cost, additional foreign exchange worth Rs.1.85 lakhs was released in January 1982 as even then the requirement was considered inescapable. Though, in February 1982 it was decided to accept the proposal to withdraw the aircraft from service from March 1983, the indent was not cancelled and the SW concluded a contract in March 1982 with a foreign firm for the supply by June 1983 for 11 parachutes at a total cost of Rs.4.06 lakhs. The quantity

ordered was increased from 10 to 11 in order to avail of the price reduction of Rs.0.04 lakh per parachute. Though Air HQ wanted delivery by January 1982, the promised delivery by June 1983 was not objected to by it.

Subsequently, in July 1983, formal approval was accorded for the withdrawal of the aircraft from service retrospectively from April 1983. Interestingly, Air HQ reminded the SW in August 1983 to expedite the supply and, thereafter, in October 1983, requested the SW to cancel the contract without any financial liability as the parachute was no longer required. However, the SW decided in October 1983, not to cancel the contract as the firm demanded cancellation charges equivalent to the contract cost. The parachutes were received in August 1984. As the aircraft was already withdrawn from service, the parachutes procured remained unutilised as these were designed and manufactured for the particular ejection seat fitted on the aircraft. The expenditure of Rs.4.06 lakhs in foreign exchange was, therefore, infructuous and avoidable.

The Ministry stated in August 1988 that the decision to phase out the aircraft was taken in July 1983, two years after the initiation of the case and, in the absence of a decision, provisioning in the intervening period was not suspended. The fact, however, remains that the proposal to withdraw the aircraft had been accepted even before the contract for the parachutes was concluded.

17. Extra expenditure in procurement of an equipment

In 1979, the Air Force (IAF) intended to induct an equipment which was an urgent, inescapable requirement to fulfil a tactical and operational role. Accordingly, the required parameters were laid down and, after a market survey, an equipment was identified. The initial requirement projected was for 13 sets. It was decided to procure three sets for immediate use and

process the balance requirement separately after considering the suitability of another similar equipment. The import of the equipment was cleared by the Electronics Commission in January 1980 subject to placing a development order on a Public Sector Undertaking (PSU). The Ministry of Defence (Ministry) then imported 4 sets in December 1981 from a foreign firm (firm) at a cost of Rs.27.69 lakhs. Out of this, one set was issued to the Navy, two were held by the IAF and one was proposed to be issued to the PSU for the indigenisation programme. Meanwhile, the requirement of the IAF had increased from 13 to 25 sets.

In 1982, the firm demonstrated an improved version of the equipment which was found suitable by the IAF. As a follow up to the demonstration, the firm offered in October 1982 the supply of the improved sets to be delivered by July 1983. According to the offer, the cost of 15 sets was Rs.150.88 lakhs and that of retrofitting the three sets supplied in December 1981 was Rs.11.58 lakhs. In November 1982, the Air Headquarters (HQ) proposed the import of five sets as there was no progress by the PSU in their indigenisation programme. This was, however, not approved by the Ministry. Air HQ, therefore, once again reiterated in May 1983 an urgent need for the equipment.

The Air HQ had been having technical discussions with the PSU since 1982 and, after considering all technical aspects, the PSU had expressed its inability to develop the equipment. However, at the intervention of the Department of Electronics, the PSU forwarded a proposal in July 1983 for the supply of 20 sets to be imported from the firm in three phases. Simultaneously, in July 1984, the firm also revised their earlier offer (October 1982) for the supply of 15 sets to the IAF at a cost of Rs.167.55 lakhs and Rs.13.18 lakhs for retrofitting the three existing sets.

Though the Ministry initially felt that

by entrusting the project to the PSU an extra amount would have to be paid and only a little saving in foreign exchange (FE) would be achieved, the order was, nevertheless, placed on the PSU, in January 1985 for the supply of 15 sets and retrofitting of three existing sets at a cost of Rs.250.18 lakhs (FE: Rs.178.80 lakhs). According to the supply order, the delivery of five sets was due by March 1985 which was later extended upto December 1985. The retrofitting of existing sets was to be completed by June 1985 and the balance 10 sets were to be delivered by December 1985. The firm supplied the seven sets in September 1986, four in October 1986 and the remaining four in February 1987, after a delay of 18, 10 and 14 months. The retrofitting of the three sets was completed in September 1986 after a delay of 15 months.

The Ministry stated in September 1988 that the equipment proposed to be issued to the PSU for indigenisation, was not issued. It was kept in storage till October 1983 and finally allotted to the IAF. The Ministry further stated that the requirement of the balance equipment is yet to be approved by the Government.

In sum, the equipment which the firm had offered to supply at a cost of Rs.180.73 lakhs was procured at a cost of Rs.251.43 lakhs through the PSU without any significant indigenisation effort. This has resulted in an extra expenditure of Rs.70.70 lakhs. The equipment identified in 1979 for procurement as an urgent, inescapable requirement for achieving improvement in the IAF's operational capability, had been procured only partly by February 1987, after seven years. The requirement of the remaining sets is yet to be approved by Government.

18. Infructuous expenditure due to over-provisioning of brake parachute

An indent for 917 numbers of brake parachute, deployed to reduce the landing speed of a particular aircraft, was placed on

an ordnance factory in October 1979 for supply by September 1980. In June 1980, Air HQ had decided to reduce the Unit Establishment of the aircraft to 57 per cent in 1982-83 and also to phase out the aircraft by 1985-86. Another indent for the procurement of 730 numbers of parachute was placed in August 1980 on the factory. Against the indent placed in October 1979, 38 numbers were received from the factory in 1980 and another 815 during 1981 and 1982.

Apart from indigenous procurement, Air HQ had also proposed in May 1980 the import of 300 numbers of the parachute from abroad to meet the requirement till December 1980 as the factory was not in a position to commence adequate supplies before October 1980. As the foreign supplier was ready to supply only 90 numbers immediately, a contract for the supply of 90 numbers at the rate of Rs.10,150 each was concluded in October 1980 and the supplies were completed by October 1981. An indent for the balance quantity of 210 numbers was subsequently raised in February 1981. Two contracts for 110 and 100 numbers at the rate of Rs.10,150 and Rs.10,658 each were concluded in May 1981 and October 1982 respectively. Supplies against these contracts were received during February 1982 and April 1983. By the time the contract for 100 numbers was concluded in October 1982, the factory had already supplied 853 parachutes.

The consumption of the item started declining gradually from 1980-81 onwards and the aircraft was phased out in April 1986 as was decided in June 1980. At the end of October 1988, 784 numbers of parachutes costing Rs.54.88 lakhs representing 40 per cent of the total procurement after 1979 were lying with the Air Force and were not required as the aircraft had already been phased out. Clearly, the provision reviews of March 1981 and May 1982 were not carried out realistically and showed a deficiency of 101 numbers against the actual surplus of

575 numbers.

The Ministry of Defence (Ministry) stated in November 1987 that the parachute could not be utilised due to low serviceability of the aircraft and flying restrictions imposed in 1980 due to low stock of the item. The Ministry also stated that it was specifically manufactured for the Air Force and its alternative use was not known.

Thus, the indenting of brake parachutes during 1979-80 and 1980-81 unrelated to the actual requirement had resulted in its over provisioning by 784 numbers costing Rs.54.88 lakhs. These can not be put to use.

OTHER CASES

19. Heavy accumulation of cotton and woollen uniforms

Government had issued orders in August 1982 introducing a revised clothing policy for Air Force (IAF) personnel. The policy, to be effective from January 1983, had envisaged the replacement of cotton and woollen uniforms by terycot and terrywool uniforms. It had also stated that the provisioning and issue of new uniforms should be so regulated as to ensure the maximum utilisation of the existing stock of uniforms. To ensure this, Air Headquarters (HQ) had issued instructions in December 1982 that one set each of terycot and terrywool uniforms be issued alongwith a set each of cotton and woollen uniforms to all airmen. It was anticipated that, by this process, the existing stock of cotton and woollen uniforms would be exhausted by 1984-85.

The Equipment Depot, Avadi (ED), holds the IAF's requirements of clothing items centrally and effects issues to user units against specific demands. An audit of the store records of the ED in May 1987 revealed a decline in the issue of woollen uniforms and cotton shirts by 56 and 76 per

cent respectively, during the period 1983-84 to 1986-87 when compared to the preceding three years. This was chiefly due to the issues having been restricted only to trainees and non-combatants (enrolled) instead of to all airmen. Consequently, large stocks of cotton and woollen uniforms valued at Rs.5.68 crores were being held by the IAF in May 1988. However, the Ministry of Defence (Ministry) stated in September 1988, that the fall in the rate of issue and accumulation of heavy stocks of winter uniforms was due to an increase in the life of the old pattern winter uniforms from two to six years and the phenomenon of 'size mismatch'. The Ministry further stated that the issues were made only to trainees as the wear and tear on their uniforms was heavy. No reasons were, however, given by the Ministry for the increase in the life of the uniform when its wear and tear had also increased. As for the phenomenon of 'size mismatch', corrective action taken had not been stated by the Ministry. According to the Ministry, the stocks of cotton uniforms valued at Rs.21.50 lakhs would be exhausted by March 1990. However, no date for utilising the old pattern woollen uniforms worth Rs.5.46 crores had been indicated by the Ministry.

Based on the average consumption during 1983-87, it would take about 18 to 25 years for the existing stocks of woollen uniforms to be exhausted. Air HQ were unable to indicate storage and handling costs of these uniforms separately. Clear instructions issued by the Air HQ in December 1982 stipulating the issue of old uniforms alongwith the new pattern of uniforms to all airmen were not complied with and resulted in large stocks being held.

20. Avoidable payment of interest in acquisition of land

Government sanctioned in December 1962 the construction of a Range at Kalaikunda at an estimated cost of Rs.19.72 lakhs. The sanction included Rs.15.99 lakhs on account of the cost of acquisition and

transfer of land measuring 3,697.19 acres. The Military Estate Office (MEO) placed the demand on the Collector, Midnapur in December 1962 for the requisition and transfer of the entire land. However, land measuring 3,722.45 acres was requisitioned subsequently in May 1963 of which, land measuring 1,019.13 acres was tenanted land, 1,178.93 acres vested land belonging to the State Government and the balance, measuring 1,524.39 acres, belonged to the forest department.

In 1964, the Government of West Bengal (State Government) demanded a sum of Rs.69.39 lakhs towards the transfer value of the vested and forest land. The State Government was requested to revise the transfer value as the sum demanded was considered high. The possession of the entire land measuring 3,722.45 acres was taken over in May 1963 but compensation/transfer value amounting to Rs.9.66 lakhs for tenanted land measuring 1,019.13 acres only was paid to the State Government.

In 1970, the State Government revised the transfer value from Rs.69.39 lakhs to Rs.38.17 lakhs and in addition, demanded a sum of Rs.10.68 lakhs as interest thereon for a period of eight years. The State Government was requested in 1970 to waive the interest and to intimate the basis for the assessment of the transfer value. Finally, in November 1980, the State Government demanded Rs.21.82 lakhs for State Government vested land measuring 1,178.93 acres. The amount included Rs.8.33 lakhs as interest at the rate of 3.5 per cent for the period May 1963 to January 1981. The transfer value of the forest land measuring 1,524.39 acres was not intimated by the State Government. However, a rough estimate cost of the forest land was worked out at Rs.17.53 lakhs and a proposal was made in June 1983 to obtain a revised sanction for payment of Rs.21.82 lakhs for the State Government vested land and Rs.17.54 lakhs for forest land.

Government revised the sanction in February 1984 amending the cost of the project to Rs.52.75 lakhs including Rs.49.52 lakhs for the cost of land. The Garrison Engineer (GE) at Kalaikunda was requested in March 1984 to make payment to the State Government for the transfer value of the land as revised. The State Government submitted in July 1984 the revised transfer value of forest land, which worked out to Rs.42.66 lakhs including an interest element of Rs.18.23 lakhs. This required further revision of the sanction to incorporate the revised transfer value of forest land as Rs.42.66 lakhs. Accordingly, the sanction was further revised in May 1986, increasing the cost of the project to Rs.79.16 lakhs.

As the payment to the State Government was not made despite repeated requests from them and the amount of interest was increasing, Air Headquarters (HQ) requested Army HQ in June 1986 to instruct the GE at Kalaikunda for early payment.

However, the amount was not released to the State Government on the plea that the accounts for the project were closed in 1969 and the accounts could not be reopened for making payment. Finally, Government sanctioned in December 1987 payment of Rs.45.44 lakhs as transfer value of forest land and assets thereon, including interest amounting to Rs.21.01 lakhs for the period from May 1963 to 23rd December 1987.

The payment was made in March 1988. The payment regarding transfer value of State Government vested land measuring 1,178.93 acres had not been made till March 1988. Interest amounting to Rs.12.11 lakhs on transfer value of the vested land has been sanctioned by the Ministry of Defence (Ministry) in January 1989 for payment to the State Government which would increase with further delay in making the payment.

The Ministry stated in September 1988 that the delay in processing the case of

payment of compensation and interest occurred mainly due to non-receipt of the reassessed transfer value of the land from the State Government which remained under correspondence for several years and also due to the GE, Kalaikunda not being able to make payment necessitating issue of Government sanction authorising payment by the MEO, Calcutta circle out of his cash assignment. The Ministry further stated that the interest liability would have been avoided had it made payment to the State Government in 1964 itself.

The case revealed an abnormal delay of over 18 years in making payment for the transfer value of the land taken over from the State Government. This resulted in payment of interest of Rs.21.01 lakhs upto March 1988. The interest liability would further increase as the payment of the value of vested land (finalised in 1980) is yet to be made. Moreover, interest was being paid from 1963 although the cost was revised by the State Government in 1970 and subsequently increased in 1980 and 1984.

21. Non-establishment of indigenous overhaul facilities

Government concluded a contract in April 1975 with a foreign supplier for the procurement of a certain number of trainer aircraft 'A' and associated ground equipment at a total cost of Rs.14.61 crores for imparting advanced training to fighter pilots of the Air Force (IAF). One of the considerations for selecting aircraft 'A' was that the costs of major overhaul of airframes and engines of aircraft 'A' were significantly lower than other aircraft. The agreement also envisaged that full assistance would be provided by the supplier to establish overhaul facilities in India. No repair facilities were, however, established in India. The Ministry of Defence (Ministry) had stated that the facilities could not be created due to uncertainty regarding long term utilisation of the aircraft and also on account of the

uncertainty whether the operation of these aircraft would stabilise as a result of the bearing failures experienced in 1977-78. A contract was concluded in August 1977 with the foreign supplier for the overhaul of engines during 1977-78 at the rate of Rs.2.08 lakhs per engine.

Under-utilisation of aircraft 'A' and the consequential shortfall in training efforts were highlighted in paragraph 6 of the Report of the Comptroller and Auditor General of India, Union Government (Defence Services) for 1981-82. The Public Accounts Committee (PAC) had recommended, vide their 215th Report (Seventh Lok Sabha) 1983-84, that the establishment of indigenous overhaul facilities be processed expeditiously so that further outgo of foreign exchange (FE) is avoided. However, no indigenous overhaul facilities were established and the airframe and aeroengines continued to be despatched to the foreign supplier for overhaul at exorbitant rates.

Subsequent developments relating to the overhaul of the airframe and engines were reviewed in Audit. The main points noticed are discussed below.

Based on escalating overhaul rates in the foreign country and uncertainties in regard to long term product support, the Finance Division in the Ministry of Defence suggested in May 1984 that the possibilities of establishing the overhaul facilities in India be explored. A financial study carried out by a Nucleus Project Team (NPT) revealed in August 1984 that the cost of overhaul of the frame, aeroengine and aggregates of aircraft 'A' in the foreign country would be Rs.44.7 crores as against Rs.36.6 crores in India. The NPT further viewed that taking into account the anticipated savings by way of adaptations and modifications of existing equipment at IAF Base Repair Depots, the total expenditure of overhauls in India would come down from Rs.36.6 crores to Rs.28 crores.

A working level team was deputed to

the foreign country in June 1984 to make a total assessment of the economic viability of the project. The team recommended in July 1984 that the unit cost of overhaul of the airframe as well as the engine in India would be lower and that the setting up of overhaul facilities would result in a substantial saving of Rs.20 to 25 crores on a long term basis.

One of the factors which the team stressed was the abnormal increase in the rates of overhauls offered by the supplier. According to the team, the rates would further increase in subsequent years if indigenous overhaul facilities were not established. This, in fact, has happened. Further the lead time for setting up of overhaul facilities in India was likely to be two years from the date of signing the contract and the overhaul of engines in India would be started by the middle of 1986 in case the contract was signed by September 1984.

The offer of the manufacturers for setting up of overhaul facilities in India was valid upto September 1984. Air Headquarters (HQ) submitted a proposal to the Ministry in September 1984 for taking an immediate decision on the issue. To a large extent, the economics of the project depended on how quickly the facilities could be established in India. Time was of the essence. At that time Air HQ were aware that the technical life of the aero-engine was likely to be increased from 1,200 hours to 1,600 hours, which would increase the number of overhaul arisings and would further decrease the cost of overhaul in India as the capital cost would be amortised over a larger number of overhauls. However, the proposal was debated by Air HQ, the Ministry and its Finance Division for over two years and the case was finally closed in February 1987. The Ministry has said that the technical life was actually extended in January 1988. It was seen, however, that engines were sent to the manufacturer for the third overhaul (at 1,200 hours stage) in 1987 itself. Obviously, adequate cognisance was not taken

of the manufacturer's clear indication in 1984 that the life of the engine would be extended.

The Ministry had also assumed that the unit establishment (UE) of aircraft 'A' would be 16 whereas the project team had anticipated a UE of 19. It has now been indicated by the Ministry that the planned UE from January 1987 to July 1988 is 24 and 28 thereafter till 1994. Clearly, therefore, the assumption was not well founded and contributed to distorting the final conclusion. Although the Ministry stated in October 1988 that no new engines were procured, it was seen that Government had concluded a contract in July 1988 for the procurement of 26 aeroengines at a cost of Rs.4.68 crores (FE) from the foreign supplier. These were purchased on account of problems that had arisen based on slippages in overhaul and delivery schedules. Of these, 10 engines would be delivered during 1988 and the remaining 16 in 1989. Obviously, these will increase the number of overhaul arisings significantly and lend further weight to the case for setting up overhaul facilities in India.

In summary, a recommendation of the Public Accounts Committee to set up indigenous overhaul facilities which was economically viable and would have prevented the outflow of foreign exchange was not implemented on account of the inordinately long time taken by the Ministry to come to a decision. The cost of the delay needs to be worked out by Government and processes instituted to avoid such costs in the future.

22. Delay in procurement of a weapon system

Government concluded two agreements with a foreign manufacturer 'X' in April 1979. Under the first agreement the manufacturer was to supply a certain number of aircraft 'A' in fly-away condition. The second agreement provided for the licensed manufacture by a Public Sector Undertak-

ing (PSU) of the balance requirement of aircraft 'A'. Aircraft 'A' did not have a maritime strike capability. In order to add this capability, the agreement concluded with manufacturer 'X' had, *inter-alia*, provided for the necessary modification of the last 20 per cent of direct supply aircraft and fitment of a particular radar at a cost of Rs.1.78 crores. The relevant radars were procured in February 1981 at a cost of Rs.3.03 crores.

At the time of signing the supply agreement in April 1979, it was envisaged that the aircraft on which the radar would be fitted would also be re-equipped with an advanced navigation system. However, delay in the selection of the navigation system led to the fitment of radar on the aircraft to be manufactured by the PSU instead of on the direct supply aircraft. The task of integration of the radar with the advanced navigation system was entrusted to an organisation in April 1983. A suitable maritime strike weapon was to be selected and integrated with the radar.

Mention was made in paragraph 35 of the Report of the Comptroller and Auditor General of India, Union Government (Defence Services) for 1985-86 about the delay in the fitment of the radar, expiry of the warranty period before fitment and non-selection of a weapon system for the maritime role. Subsequent developments relating to the procurement of a weapon system were reviewed in Audit and the main points noticed are discussed below.

Although it was decided in 1979 that 20 per cent of aircraft 'A' would be modified to accommodate a radar for the maritime role, and the radars were also contracted for in 1979, action to identify a suitable weapon system to be integrated with aircraft 'A' and the radar, as well as the action to obtain comprehensive proposals from manufacturers of such weapon systems was initiated only in November 1982. It was brought out in the proposal that modification of aircraft

'A' by the PSU for fitment of the radar would be completed by 1985-86. The integration of a weapon system with aircraft 'A' and related avionics would also be taken up concurrently with the radar integration to ensure early availability of aircraft 'A' for the maritime strike role.

Till 1982, the Indian Air Force (IAF) had only a limited maritime strike capability based on an ageing aircraft 'B' which was to be replaced by modified aircraft 'A'. In January 1983 Air Headquarters (HQ) invited proposals from well known weapon manufacturers. Rough estimates and some technical details were received from two foreign manufacturers 'X' and 'Y'. The operational parameters for the weapon system were finalised only by May 1983.

Separately, a contract with the foreign manufacturer 'X' was entered into in July 1983 by the Navy for the procurement of 20 similar weapon systems at a cost of Rs.93.51 lakhs in free foreign exchange (FFE). The contract provided two options for the procurement of an additional 60 weapon systems at a unit price of Rs.92.72 lakhs. While the first option for 24 additional weapon systems was to be exercised by July 1985, the second option for 36 additional weapon systems was to be exercised by August 1986.

In March 1985, two years after efforts to identify a suitable weapon system had commenced, Government approved the procurement of 20 weapon systems together with associated equipment at an estimated cost not exceeding Rs.61 crores at 1985 price level including escalation with an option for an additional quantity of 10 weapon systems. The Government also decided to constitute a Committee for negotiating the proposals and finalising the contract.

Thereafter, two manufacturers were requested to submit their firm proposals by May 1985. While a complete proposal including that for integration of the weapon system with aircraft 'A' was received from

manufacturer 'X', no such proposal was received from manufacturer 'Y'. Manufacturer 'X' also stated that he would have no objection in Government exercising the option available in the Naval contract. The Navy also had no objection. The option, however, was not exercised. It was decided, therefore, to have fresh negotiations with manufacturer 'X'. Since much time had elapsed after the receipt of the first proposal, a fresh proposal with 1986 base price was invited from manufacturer 'X'. This was received in January 1986.

The offer of Rs.55.49 crores (FFE) was finally negotiated at Rs.45.41 crores (FFE). The major reduction achieved was in respect of the integration task by taking additional responsibility for such work to be carried out indigenously. The total negotiated cost for the package exceeded the amount approved in March 1985 by Rs.17.49 crores of which an amount of Rs.11.83 crores was attributed to variations in exchange rates and Rs.5.66 crores was attributed to a postponed delivery schedule (1988-89) (as against 1987-88 had the contract been signed in early 1985). Although the negotiating committee recommended the conclusion of a contract with manufacturer 'X' at a total cost of Rs.45.41 crores in June 1986, no contract was signed.

In June 1987, Government approved afresh the procurement of 20 weapon systems and associated equipment at an estimated cost of Rs.52.97 crores (base price plus escalation) with an option to secure an additional 10 weapon systems. Eventually, a contract with manufacturer 'X' was concluded in August 1987 at a total cost of Rs.45.41 crores (FFE). The delivery of the weapon system would commence from August 1989 and would be completed by May 1990.

Planning inadequacies are clearly evident in this case. The search for the weapon system which had to be integrated with the radar contracted in 1979 commenced

only in 1982. It took Air Headquarters five years until August 1987 to conclude a contract for the weapon system even though the Navy had already contracted a similar system in July 1983. Further, the radars procured in 1981 at a cost of Rs.4.46 crores would be put to effective operational use only after nine years. In short, the integration of the weapon system, avionics and radar jointly with aircraft 'A' which was considered by the IAF as the most cost effective approach in 1982 has not been achieved.

Apart from the increased costs already identified, it was noted that five indigenously produced aircraft fitted with radars for the maritime strike role were received by the IAF in early 1986-87 and two more were expected by March 1988. These aircraft will be available for their role only by 1990 subject to the successful integration of the weapon system. The Ministry of Defence (Ministry) stated in September 1988 that, in the meanwhile, these aircraft would be used with conventional weapons. Against this background, it is fortuitous that the strength of the maritime strike force which the IAF had sought to be augmented was not increased. The Ministry stated that the increase in the strength did not take place due chiefly to financial constraints.

These developments, which resulted in a sub-optimal maritime strike capability over an extended period, need to be viewed seriously by Government and evaluated comprehensively with the objective of preventing their recurrence.

The Ministry stated in September 1988 that the requirement of installation of the weapon system on aircraft 'A' had to be shifted to a later date on account of the delays in modification development as a result of which installation of the radar systems on the aircraft itself got delayed. It also maintained that it did not take four years for Air HQ to identify a suitable weapon sys-

tem. While stating that the modified aircraft 'A' is available for the maritime role, although with conventional weapons, the Ministry indicated that non-availability of the weapon system can make the aircraft

vulnerable in an operational environment. It also conceded that non-availability of the increased number of aircraft has prevented the expansion of the maritime force as planned.

CHAPTER IV

NAVY

REVIEWS

23. Training establishment

23.01 Introduction

INS Shivaji, Lonavala, is the premier training establishment for technical and engineering personnel and officers of the Indian Navy. It was set up in 1945 as a Stokers Training School. The College of Engineering, School of Marine Technology, Base Engineering Department and Nuclear, Biological, Chemical Warfare and Damage Control School have also been established over the years. The establishment undertakes basic and professional training for control, maintenance, operation and repair of complex, main and auxiliary machinery fitted on board Indian Naval ships. Personnel from foreign Navies, para military forces and Public Sector Undertakings are also trained.

May 1981 Committee of Audit

The existing training facilities available at INS Shivaji, their augmentation and establishment of certain new facilities under a 'Master Plan' prepared in 1981 and other associated activities like procurement of stores, equipment, installation and commissioning of machinery relating to establishment of major facilities and other related matters towards realisation of targets fixed under the plan were reviewed in Audit.

23.03 Highlights

- **The training facilities at INS Shivaji were established piecemeal and did not keep pace with training requirements necessitated by the induction of modernised, sophisticated and new ships over the years. The facilities were considered grossly inadequate which culminated in the preparation of a Master Plan in 1981**

involving an investment of Rs.85.00 crores to bring the facilities to the required standards during 1981-1991. The tardy progress of various major activities indicates the absence of sound procedures for the proper planning, monitoring and implementation of a project towards timely realisation of targets. Virtually none of the facilities contemplated under the plan had been commissioned till January 1988. Consequently, the training facilities, particularly the practical aspects, would continue to be below professional standards. This would affect the operational preparedness of trained naval manpower significantly.

- Besides, shortages in the instructional staff against the authorised strength had also affected training efforts to a considerable extent. The available training facilities also remained underutilised apart from serious shortages in the induction of trained officers in the Navy.

23.04 Master Plan

The existing training facilities were set up piecemeal. The establishment had not come up in a planned manner. The facilities were considered grossly inadequate considering the training commitments of the Navy. A Master Plan was prepared by the establishment in early 1981 to improve and modernise the training facilities on a long term basis during 1981-1991. The plan envisaged the creation of certain new facilities and augmentation of existing facilities. It had a financial outlay of approximately Rs.85.00 crores. It comprised Rs.38.00 crores and Rs.47.00 crores towards training facilities and supporting infrastructure respectively. Implementation of the plan was contemplated in phases. For speedy completion of the facilities, the employment of consult-

ants at a cost of Rs.17.00 lakhs was also sanctioned in December 1984. Primarily, the consultancy work was of a technical nature. It, *inter alia*, included the locating of suppliers for the equipment and installation material, and examining quotations and contracts in detail. A contract regulating the terms and conditions of consultancy was concluded in February 1986.

Under priority I and II of the plan, a provision of Rs.33.19 crores including Rs.8.16 crores in free foreign exchange (FFE) was made towards procurement of equipment and training aids for the creation of facilities which were planned to be established by 1991. Procurement of equipment and stores was sanctioned to the extent of Rs.12.79 crores during October 1981 to April 1985 vide details given below:

	Provision in the plan (Rs.in crores)	Procurement sanctioned (Rs.in crores)
Priority I	30.79	12.79
Priority II	2.40	Not yet sanctioned

Procurement of the remaining stores had not been sanctioned till October 1987. Equipment costing Rs.7.63 crores only was received upto October 1987. It included imported stores worth Rs.6.69 crores. Associated civil works costing Rs.6.82 crores were sanctioned during August 1981 to December 1986, of which, works costing Rs.3.22 crores had been completed, works to the extent of Rs.2.38 crores were expected to be completed by February 1989 and works costing Rs.1.22 crores were under planning. It was stated by the Ministry of Defence (Ministry) in September 1988 that the balance work services had also been sanctioned and were to be executed. None of the facilities had been fully commissioned due to delay in the issue of sanctions for civil works as also the delay in procurement of equipment and training aids. The Ministry stated that the facilities under priority I were expected to be ready by mid 1989. Conse-

quently, Naval HQ had to sanction civil works costing Rs.11.42 lakhs during July 1985 to June 1987 towards creation of interim facilities. Works to the extent of Rs.3.46 lakhs only had been completed upto January 1988.

23.05 Electro mechanical complex

Certain ships were acquired by the Navy at a considerable cost against an agreement concluded in 1975. A specific type of training was essential to keep the ships fully operational and adequately maintained. The training in India covered weapons and engineering aspects. The facilities proposed at INS Shivaji related to the engineering field only and formed a part of the Mechanical Training School under priority I of the plan. Procurement of indigenous equipment and their installation was sanctioned in April 1983 at a cost of Rs.81.66 lakhs and Rs.88.00 lakhs respectively. Connected civil works were sanctioned in March 1983 at a cost of Rs.128.00 lakhs, revised to Rs.129.67 lakhs in November 1984. The main building work was completed in February 1987. However, the work of cooling tower, mechanical ventilation and external water supply was pending till October 1987. Imported equipment costing Rs.6.00 crores received upto August 1982 had not been installed or commissioned till October 1987. The Ministry stated that all the static equipment and accessories had been installed and that live equipment and accessories were awaiting installation. Indigenous equipment sanctioned in April 1983 had not even been procured upto October 1987. Their requirement and procurement was stated to be dependent on installation of imported equipment and matching of system fittings. Thus, the essential engineering training facilities involving an investment of Rs.1,099.53 lakhs were not available for ships acquired at a considerable cost.

23.06 Internal Combustion Piston Engine (ICPE) workshop

Training imparted at INS Shivaji had

remained mainly steam oriented as most of the ships in service were propelled by steam. Priority I of the plan envisaged modernisation of these facilities as the existing facilities did not keep pace with the new acquisitions. The requirement of adequate training facilities was recognised and replacement of obsolete facilities contemplated as early as 1970.

The machinery, land and civil works required for installation of the equipment and services for the proposed facilities had been worked out by a board of officers in July-August 1979. The rough cost of civil works was assessed at Rs.75.42 lakhs while the cost of equipment and machinery could not be estimated. The project was also analysed by a study group in 1981. Modernisation of the facilities was sanctioned in October 1982 at a total cost of Rs.358.37 lakhs. It included civil works worth Rs.144.02 lakhs and the procurement of equipment worth Rs.211.90 lakhs. The facilities were proposed for completion by 1985. The civil works were sanctioned in March 1983 at a cost of Rs.146.75 lakhs. The requirement of equipment was modified by Naval HQ from time to time and finalised only in July 1985. Till September 1988, only static equipment had been received and installed. Live equipment had not been received fully. Action was in hand to procure the balance equipment. Completion of civil works, other than the main building and related technical facilities by October 1987, was indicated as uncertain. None of the equipment procured had been installed upto October 1987. The Ministry stated that the conclusion of an installation contract for live equipment was under progress in September 1988. Thus, essential training facilities whose urgent requirement was recognised in 1970 involving an investment of Rs.358.32 lakhs, were not available till October 1987 in spite of its status as a Priority I requirement in the Master Plan of 1981.

23.07 Heat engine laboratory

The required facilities for heat engines were not available at the establishment. It was a major handicap in the training effort. Officers were being deputed to other organisations for short durations for the intended training. This arrangement was considered highly unsatisfactory. The requirement of equipment and civil works needed for establishing the Heat Engine Laboratory (HEL) was assessed by a board of officers in September-October 1980. The establishment of HEL was included in the plan under priority I. Procurement of equipment at a cost of Rs.44.54 lakhs was sanctioned in November 1981. The building work was completed in October 1985 at a cost of Rs.31.99 lakhs and taken over by the users in February 1986. Till September 1988, equipment costing Rs.36.5 lakhs approximately had been received against Rs.45.54 lakhs sanctioned. Consequently, the laboratory had not been fully commissioned. The Ministry, however, stated that the officers were being trained in the laboratory and were no longer being deputed to other organisations.

23.08 Nuclear, Biological and Chemical Warfare Damage Control School (NBCD)

Under priority I, the plan envisaged the creation of NBCD training facilities at an estimated cost of Rs.131 lakhs - Rs.70 lakhs for civil works and Rs.61 lakhs for equipment. Procurement of equipment at an estimated cost of Rs.59.96 lakhs was sanctioned during December 1982 to September 1983. Till October 1987, equipment valued at Rs.12.75 lakhs only were received. Procurement of the remaining equipment was at various stages. Civil works were not sanctioned till October 1987. The Naval Command HQ, however, accorded sanction in May 1986 for the construction of additional accommodation at an estimated cost of Rs.8.28 lakhs. The work had not been

awarded. The proposed training facilities were not available till January 1988.

23.09 Training activities

Pending setting up of the proposed facilities under the Master Plan, ten courses in basic engineering were conducted during December 1979 to June 1987 at the College of Engineering. Against the optimum planned capacity of the college of 300 officers, the planned intake was only 277 officers in respect of these courses. Only 158 officers passed out eventually. This resulted in a shortfall of 47.33 and 43 per cent of the planned capacity and intake respectively. Similarly, the shortfall in respect of marine engineering specialisation courses conducted during September 1982 to October 1987 for officers of direct entry, university and basic engineering course batches was 40.27 per cent in terms of the planned intake of 370 officers against 221 officers who finally passed out. These figures include foreign trainees. For 60 other courses of shorter duration undertaken during 1982-83 to 1986-87, the planned intake and the actual strength were 1,276 and 1,021 respectively. The overall shortfall worked out to 20 per cent. Non-availability of sufficient officers in individual courses was stated to be the main factor responsible for the shortfalls.

Clearly, the planned intake of officers itself was erratic. While the available training facilities remained largely under-utilised, it led to large scale shortfalls in the induction of officers in the engineering branch of the Navy. To overcome the shortages, a 'Sponsored Cadet Entry Scheme' to induct qualified technical officers directly from the Indian Institute of Technology and selected engineering colleges had to be introduced in 1983. Similarly, induction into the engineering and electrical branches of the Navy had to be sanctioned in March 1984 from the 10+2 stage. Officers from these schemes would be available only in 1988.

Availability of instructional staff

against the authorised establishment during the period from 1982-83 to 1985-86 was short to the extent given below:

Year	Shortages in Percentage			
	1982-83	1983-84	1984-85	1985-86
Officers	68.86	62.82	56.41	58.97
Senior Sailors	33.33	26.89	25.21	27.77
Junior Sailors	69.47	80.00	77.89	78.18
Civilians	12.38	7.61	7.61	18.14

This resulted in shortfalls in terms of man-week training efforts in respect of officers to the extent of 38.43 to 61.87 per cent during 1982 to 1986.

Shortfalls in respect of instructors training courses during the same period were as follows:

Year	1982	1983	1984	1985	1986
Planned efforts	1052	1213	1780	1941	2265
Actually achieved	566	728	1213	1213	1456
Shortfall (percent)	46.19	39.98	31.85	37.50	35.71

The Ministry stated that all the training tasks assigned had been completed by loading the existing training staff with extra work. However, if this was done without any adverse impact on the establishment, there would appear to be scope for reducing the establishment's sanctioned instructional strength.

An amount of Rs.121.21 lakhs was outstanding for recovery from foreign governments towards the cost of training imparted to their personnel during 1982-83 to 1986-87. Similarly, the cost of training of officers of the Coast Guard and various Public Sector Undertakings had also not been recovered to a considerable extent. The Ministry was unable to provide detailed figures in this respect.

23.10 Other topics

Other disquieting features noticed in Audit related to the non-utilisation of married accommodation after its construction, replacement of stores rendered beyond eco-

nomical repair at enhanced cost and the non-availability of simulators for imparting training as contemplated. The details are:

(a) Three storeyed married accommodation for sailors was sanctioned at a cost of Rs.78.90 lakhs by Naval HQ in February 1984. The work was scheduled to be completed by June 1987. Though the construction was completed by October 1986, the building was not handed over to the users till September 1988 as the connected services were not ready. Consequently, the accommodation could not be allotted to the personnel even after its completion. In the meantime, compensation and allowances for accommodation to the extent of Rs.2.96 lakhs had to be paid during November 1986 to March 1988.

(b) Replacement of equipment declared beyond economical repair in the School of Marine Technology was contemplated by the establishment in four phases. A sanction was issued in October 1973 for the replacement of 46 items in phase I at a cost of Rs. 7.29 lakhs. Their installation was sanctioned in August 1975 at a cost of Rs.0.42 lakh. Sanction was issued in December 1975 to the replacement of 47 items at a cost of Rs. 10.60 lakhs in Phase II. Due to delay in arranging the procurement, the cost of equipment under phases I and II had to be revised to Rs.21.15 lakhs and Rs.36.22 lakhs in May 1985. Under phases III and IV, replacement of 61 and 46 equipment was recommended in May 1981 and November 1985 respectively. Against 200 equipment intended for replacement, 116 had been surveyed on receipt of their replacement till October 1987. The remaining machines were in use pending their replacement. Delayed procurement of 36 lathe machines under phases I and II in 1987 resulted in extra expenditure to the extent of Rs.5.34 lakhs when compared to the cost of lathe machines

procured in 1982 under Phase III from the same source.

The Ministry stated that the delay in procurement of the equipment was due to the following:

- Inability of Indian supplier to supply equipment as per specifications,
- Repeated tenders due to non-availability of offers and
- Extension of time sought by the suppliers.

It added that efforts were in hand to procure the items on priority.

(c) In 1984, Naval HQ approved in principle, the setting up of a simulator complex at the establishment for seven types of simulators for various ships. The complex was planned to be sanctioned during 1985-86. The board of officers could make recommendations only for two simulators for ships of classes 'A' and 'B'/'C'. In respect of the remaining five simulators, the board could not say anything as a proper project report was not available. Thereafter, the design and development of a training simulator for the machinery control room of class 'A' ship was sanctioned in July 1984 at an estimated cost of Rs.78.07 lakhs including Rs.5.00 lakhs in foreign exchange. The simulators for ships of classes 'B' and 'C' were expected to cost Rs.2.38 crores. Works services to house the two proposed simulators were sanctioned by NHQ in December 1985 and the contract concluded in April 1987 at a cost of Rs.58.72 lakhs. This envisaged completion of the works by July 1988. The simulator for ships of class 'A' was received at the establishment by the end of 1987 and installed at an interim site. Installation at its permanent accommodation was expected to be completed by early 1989 on completion of civil works. Sanction for the remaining six types of simulators

had not been issued till December 1987. In effect, therefore, the establishment had training simulators for ships of class 'A' alone.

24. Establishment of a communication station

24.01 Introduction

The setting up of a transmitting station capable of communicating with submerged submarines was recognised by Government in 1971 and the project was approved in September 1976 at an estimated cost of Rs.12.00 crores (FFE:Rs.6.00 crores) to be completed within a period of six years. According to Government sanction of February 1978, the project was required to be completed and handed over to the Navy by February 1984. The project is still to be completed.

24.02 Scope of Audit

The planning, management and execution of the project have been reviewed in Audit. The effects of the delay on project costs and the impact on operational efficiency have also been examined.

24.03 Organisational arrangements

The project was to function as one autonomous unit to be administered by a Management Board sanctioned in February 1978 and headed by the Scientific Adviser to the Raksha Mantri. The Board was empowered to take decisions on all administrative, financial and technical matters connected with the project. Besides, a project study group was also formed to work out the individual details of the project and to prepare a detailed project report within 12 months. The board was required to inform Naval Headquarters and the Ministry of Defence of all important developments periodically.

24.04 Highlights

- **Although the necessity for the transmitting station was recognised in 1971, the**

project was approved only in 1976. The technical and financial evaluation, based on which the project was sanctioned, proved faulty.

- **No complete system approach was adopted. Consequently, system compatibility could not be achieved. In the absence of a total system definition, the various Qualitative Requirements (QRs) floated for the project revealed serious flaws in system integration.**
- **The synchronisation of various indigenous development activities, the construction of civil works and the procurement of requisite equipment and machinery could not be achieved chiefly as a result of poor project concept and inadequate planning and management.**
- **The requisite communication link between the shore installations and submerged submarines could not be established fully even twenty years after its necessity was recognised by the Navy.**
- **Clearly, this has an adverse and direct bearing on their optimum exploitation.**
- **There have been serious cost and time overruns as the project cost is presently estimated at Rs.122.16 crores as against Rs.12.00 crores originally contemplated.**
- **Presently, the most important systems under development indigenously are expected to be available only by the end of 1989. The functional utility of the system as a whole can only be established thereafter.**

24.05 Project background

Apart from meeting an important requirement of submarines, the project is to provide increased communication facility to the entire fleet and contribute significantly to the command and control functions. Government decided to undertake the project indigenously at an estimated cost of Rs.12.00 crores (FFE:Rs.6.00 crores).

A detailed Project Report was required to be rendered by the Study Group within 12 months. However, no Project Report was prepared by the Study Group as required. In fact, no comprehensive document was prepared defining the level of interfaces, interoperability and integration between various transmission and reception sub-systems indicating the total system overview of the project. According to the Ministry of Defence (Ministry), it was practically impossible to make one single comprehensive document with details upto the lowest level. However, inspite of this serious and glaring omission, the setting up of the project at an estimated cost of Rs.77.22 crores (FFE: Rs.19.93 crores) was approved by Government in September 1982.

24.06 Project definition

The Project Definition Phase was sanctioned in June 1980 at a cost of Rs.170.00 lakhs (FFE:Rs.75 lakhs) to commence in July 1980. Originally scheduled to be completed within 18 months, the completion date was extended upto January 1984. It was decided in January 1981 to seek necessary consultancy assistance for defining hardware specifications. The conclusion of consultancy services contract was sanctioned in October 1981 at a cost of Rs.177 lakhs in FFE. The services contemplated in the contract related to preliminary studies, model studies, detailed design, construction support and proof of performance. The implementation Phase of the project was sanctioned in January 1984, to be completed by July 1988.

24.07 Project implementation

In May 1984, it was decided to locate all the facilities relating to the project at station 'A'. Works services were sanctioned in June 1987 at a cost of Rs.900.57 lakhs-revised to Rs.933.24 lakhs in November 1987. The Ministry stated in October 1988 that a few more works were sanctioned later. It added that completion of the works was expected by 1989. The project was required

to be linked with Command Headquarters for purposes of operational exploitation and administration. In the process, an Information Source Sub-system (ISS) comprising of Automatic Message Handling System (MASH), and other land links and radio circuits were planned to be established. Besides, the installation of a transmission system was also contemplated. On the submarines, a receiving system was to be installed. The Ministry clarified that this new emerging technology was being developed by Research and Development and was for effecting further improvement in the performance of the system.

The Qualitative Requirements (QR) for MASH were sent to various firms and price negotiations carried out between February and May 1986. A State Public Sector Undertaking 'X' (PSU 'X') was selected and negotiations were held in June 1986. The matter was subsequently delayed and an order was placed on PSU 'X' in March 1988 after revising the QR in December 1987 at a cost of Rs.42.86 lakhs. The supply was to be completed by September 1988. The equipment was scheduled to be installed by October 1988 when proof of performance tests on the system as a whole would be completed.

The configuration for High Frequency communication link equipment was drawn up in August 1986 and the requirement projected to PSU 'B' in October 1987. No order had been placed till March 1988. This component of the project will obviously be delayed. The Ministry explained that this would not affect operational performance as the necessary equipment had been diverted from within the existing resources and its installation and testing was scheduled to be completed by October 1988.

The Receiving System project was planned for completion by January 1987. It has three important sub-systems which were being developed by Defence R and D laboratories. In all cases, performance of the

equipment fell short of Naval requirements and QRs had to be modified. In one case, the QR was diluted without proper approval. The development of the equipment was expected to take one year after the system compatibility had been established. In fact, no integrated system approach was adopted with the result that indigenous development efforts progressed in isolation and system compatibility could not be achieved. This, together with the inordinate delay in the development of two sub-systems, had upset the implementation schedule of the main project. Two sub-systems are now expected to be available only by the end of 1989. The Ministry, however, stated that the QRs were not allowed to be diluted. It was added that the QRs for two sub-systems had been upgraded and the requirement worked out were being incorporated. As for the receiving antenna for submarines, no QR was formulated and no indigenous development undertaken. Accordingly, this important feature of the programme would have to be import dependent. Thus, the basic aim of the main project would not be achieved fully as the submarines would be incapable of receiving transmission on the basis of their existing equipment fit. The resulting handicap would be operationally serious. The Ministry clarified that the proposed system of transmission was intended to be an improvement over the existing system of communication which was in existence for a few decades. It had certain operational limitations. For better performance, it was added, certain equipment required was not available in the country and per force had to be import dependent. Efforts made to import these equipment so far, did not prove successful.

24.08 Project costs

The cost of the project was revised to Rs.122.16 crores (FFE: Rs.19.77 crores) in June 1987. The main factors responsible for increase were under-estimation at the initial stage, inflation, additions and changes in the scope of work and inclusion of new items of

work not earlier contemplated. Evidently, the technical and financial appreciation of the project conducted initially was grossly inadequate. This resulted in increased costs and delays affecting operational efficiency. Although it was stated in March 1988, that the project was expected to be completed by December 1988, in the absence of the equipment for use by submerged submarines and the Satellite Earth Station (SES), the main objective of the project can hardly be said to have been achieved. According to the Ministry, the technical appreciation, as was possible within the constraints of available information, was carried out and the financial appreciation was based on this technical appreciation only. Further, it was stated that the final technical and financial appreciation of the project was available only in 1987. Essentially, therefore, it took about 18 years to firm up the technical and financial parameters of the project from the date it was conceived (1968).

An expenditure of Rs.90.67 crores (FFE: Rs.18.18 crores) had been incurred on the project upto 31st March 1988.

24.09 Contracts for an equipment system

A contract for the design manufacture, testing and commissioning of an equipment system was concluded with firm 'A' in March 1984 for Rs.42.50 crores, reduced to Rs.41.27 crores in February 1985. The contract envisaged the supply of 5,943 metric tonnes of steel costing Rs.499.78 lakhs for fabrication. Adjustment of the value of scrap arising in the process was pointed out by Audit. Eventually, credit of Rs.9.33 lakhs was accepted by the firm in April 1988.

A sum of Rs.9.87 lakhs was reimbursed to the firm towards payment of demurrage and wharfage charges to the Port Trust concerned due to a delay in the clearing of imported materials. The delay was on account of the firm waiting for orders of extension of the period of adhoc duty exemption. The payment of demurrage charges

could have been avoided had the imported items been cleared on payment of customs duty and refund obtained subsequently after issue of Government orders extending the period of exemption. The Ministry stated that the demurrage and wharfage charges were paid with a view to avoid payment of exorbitant customs duty.

The cost of fabrication of steel items was subject to an escalation of 0.10 per cent for every rupee (or part thereof) increase in the wages of the minimum rated worker. However, the price of fabricated material included an amount of Rs.80.70 lakhs towards cost of transportation. Cost escalation amounting to Rs.7.23 crores admitted on fabricated materials included an amount of Rs.34.89 lakhs on transportation charges. Obviously, this was not in order and would require adjustment. The Ministry stated that the contractual position of the Government was rather weak. However, it added that adjustment would be done once a final decision had been taken about wage escalation on the value of transportation. The issue was stated to be under active pursuit with the firm.

The firm was required to complete erection of the centre mast of the antenna system by August 1985. In fact, it was completed in October 1986. This delayed the construction of technical accommodation to be built around the mast and resulted in the following extra expenditure:

- Rs.2.15 lakhs had to be paid to a foreign firm 'Y' owing to delay in making available accommodation for commencement of installation of machinery and equipment.
- The cost of services for installation of equipment was also increased by Rs.8.06 lakhs approximately by firm 'Y'.
- Firm 'Z' was required to complete the work for technical accommodation within 13 months from commencement in Oc-

tober 1986. The work was still (March 1988) to be completed. Consequently, the consultancy contract with firm 'XX' for the construction of technical accommodation had to be extended upto March 1988. This involved an avoidable expenditure of Rs.11.34 lakhs.

The Ministry clarified that compilation of design data, layout drawings, heat loads and cooling requirement etc. were other contributory factors which delayed the construction of the technical building around the mast. It was further stated that the additional payment of Rs.11.34 lakhs to firm 'XX' was still under the consideration of the Government.

25. Delay in setting up of training facilities

25.01 Introduction

A certain number of ships of different types were received and commissioned from December 1976 to August 1983. Two contracts were concluded with a foreign Government in July 1980 and December 1980, for the supply of equipment and installation materials at a cost of Rs.0.11 crores and Rs.34.76 crores respectively for setting up of training facilities.

25.02 Scope of Audit

A review on the progress of the setting up of training facilities at Naval establishments 'C', 'D', 'E', 'F' and 'G' at station 'A' was carried out in Audit.

25.03 Project organisation

In August 1978, a Naval Command proposed the creation of a special project team for the management of project implementation. After a lapse of over 4 years, the Ministry sanctioned, in March 1983, the creation of a Directorate of Installation, Naval Training for the execution of the project. During the intervening period, the implementation of the project was carried out by a cell created for the purpose.

25.04 Highlights

The review brings out, *inter alia*,

- the installation of training equipment, envisaged to be completed by 1982, commenced only in April 1984, and would be available by 1990 while the ships had been commissioned prior to August 1983.
- the time overrun was due to the delay in completion of civil works which resulted in non-installation of equipment worth Rs.24 crores and consequent creation of additional storage space at a cost of Rs.28.82 lakhs.
- the delay had an adverse impact on the training efforts of the Navy.

25.05 Execution of the project

(a) Planning

According to the plan finalised in April 1979, the time frame for the completion of the project was as follows:

- (i) Execution of civil works - September 1981.
- (ii) Delivery of equipment - December 1981.
- (iii) Installation and commissioning of equipment - March 1982.

Due to the delay of 18 months in concluding the contracts for the supply of equipment, the time frame for execution of the project was extended by 18 months.

(b) Progress of execution

A Board of Officers recommended in October 1980 the construction of technical and residential accommodation at a cost of Rs.80.77 crores. Naval Headquarters (HQ), however, decided in August 1981 to delink the execution of the civil works from the main project and to execute it by according sanctions under the financial powers delegated to Naval

authorities. Evidently, this was done to avoid possible delays in getting approvals from the Ministry.

Fifteen sanctions amounting to Rs. 1.65 crores in all were issued by the Naval Command during March 1980 and May 1986 for civil works relating to the Naval establishments 'C', 'D', 'E' and 'F'. These works were delayed in terms of the time frame which required all civil works to be completed by September 1981.

Based on the recommendations of another Board which assembled in December 1981, the Ministry of Defence accepted the necessity in January 1983 for construction of the Naval establishment 'G' and sanctioned the works services in August 1984 at a cost of Rs.7.91 crores. Besides, 20 other sanctions amounting to Rs.6.91 crores were issued between February 1980 and August 1987 by the Naval authorities for facilities to be created at Naval establishment 'G'. The probable date of completion of the project was December 1989 which was later extended upto March 1990.

The majority of the works are still at preliminary stages of construction and expenditure to the end of March 1988 was Rs.2.08 crores. Since establishment 'G' was the most important among the training facilities being set up, the delays in setting it up resulted in non-realisation of the crucial practical training benefits anticipated.

(c) Procurement of equipment and installation materials.

The supply of the equipment and installation materials under the contracts of July 1980 and December 1980 commenced in 1981 and 85 per cent of the equipment had been supplied upto 1983. The rest was supplied between 1985 and 1988. The equipment for establishments

'C', 'D', 'E' and 'F' was progressively installed on completion of civil works during April 1984 and March 1988. The training facilities at these establishments, therefore, remained incomplete till March 1988. However, equipment worth Rs.24 crores meant for Naval establishment 'G' which was received during 1981 to 1983 had not been installed as the civil works are likely to be completed only by March 1990.

In addition to the imported equipment, the Ministry also sanctioned in March 1987 the procurement of indigenous equipment at a cost of Rs.1.40 crores and installation charges for imported and indigenous equipment at an estimated cost of Rs.2.54 crores. Against this sanction, only indigenous equipment costing Rs.12.72 lakhs had been procured and an amount of Rs.44 lakhs has been incurred on installation charges upto May 1988.

The non-installation of the equipment necessitated the creation of storage facilities for the equipment. In addition to the sanction of storage accommodation for the imported equipment given in January 1979 for Rs.17 lakhs (increased to Rs.23.58 lakhs in March 1980), the Naval authorities accorded 4 sanctions during May 1984 to March 1987 for the construction of additional air conditioned storage accommodation for Rs.28.82 lakhs. This expenditure was avoidable had the arrival of equipment and completion of civil works been synchronized through careful planning and adequate monitoring of project implementation. In summary, the training facilities envisaged in 1975 relating to ships acquired between 1976 and 1983, would not be fully available till 1990 by which time a large part of the useful life of the ships would be over.

The Ministry stated in September 1988, that the first commissioning and training teams for each class of ships were trained

in the foreign country. These training teams subsequently trained replacement crew with the help of documents and visual aids and practical training was done on board the ships.

TRAINING

26. Non-installation of training equipment

Based on Naval Headquarters' (HQ) indents of December 1971, February and September 1972, a Naval Training Establishment received from June 1975 onwards four training equipment 'A', 'B', 'C' and 'D' valued at Rs.52.04 lakhs in foreign exchange (FE) from a foreign supplier. The equipment were required for the establishment of certain training facilities. All items indented in respect of the equipment were not received. Most of the items not received were essential both for the installation of the equipment and subsequent training.

The short receipt of items was intimated to the Supply Wing of an Indian Mission abroad in July 1979, April 1982 and March 1984 after a delay of three to five years subsequent to the receipt of the equipment. The supplier advised in December 1979 that the items stated to be missing had been supplied alongwith the original equipment and the supplies had been completed with the despatch of some outstanding items in October 1976. The Ministry of Defence (Ministry) stated in September 1988 that the cost of missing items was not available as it was not furnished by the supplier.

The non-availability of the items adversely affected installation of the equipment. Equipment 'B' was installed in December 1985 and was energised by carrying out certain modifications. Equipment 'C' and 'A' were installed in March 1983 and September 1986 but were not energised due to the non-availability of the required items.

Equipment 'D' valued at Rs.6.20 lakhs received in April 1979 had not been installed at all. Only passive training was possible in respect of equipment 'A', 'C' and 'D'. Training needs were, thus, seriously affected and the investment of Rs.30.03 lakhs (FE) on equipment 'A', 'C' and 'D' remained largely unproductive.

WORKS SERVICES

27. Setting up of an armament depot

In 1975, Naval Headquarters (HQ) initiated a proposal to set up a Naval Armament Depot (NAD) in Orissa to meet increased requirements of the Navy. While the Ministry of Defence (Ministry) accepted the proposal in December 1975 at a cost of Rs.9.56 crores, no formal sanction was issued. A 'go ahead' sanction was issued by the Ministry in January 1977 for site clearance, construction of approach road, office and residential accommodation for the construction staff at a cost of Rs.41.83 lakhs. A second 'go ahead' sanction for the provision of external services at a cost of Rs.47.53 lakhs was issued in May 1980. Formal sanction for Phase I of the project was finally accorded by the Ministry in February 1981 at a cost of Rs.415.33 lakhs. The amount was later increased by a series of orders to Rs.452.35 lakhs. The provision in the sanction for a railway siding at a provisional cost of Rs.30.25 lakhs was later deleted and a separate sanction for the siding at a cost of Rs.198.33 lakhs was issued by the Ministry in August 1984. Subsequently, the cost was further increased to Rs.214.75 lakhs in January 1988. Thus, the total cost of the project sanctioned piecemeal at various stages was Rs.667.10 lakhs against a planned expenditure of Rs.536 lakhs. Phase II of the project had not been sanctioned till September 1988.

The construction was completed by February 1986 but the work on the siding had not been completed. The NAD started

functioning in December 1986 with a complement of three officers and 21 subordinates. The subordinate staff strength was later increased to 59 with effect from October 1987 as against the sanctioned strength of eight officers and 159 subordinates. However, no stores were held by the NAD till February 1988 due to non-completion of the siding and delay in sanction of personnel for security. Stores were moved to the NAD from March 1988, and at the end of September 1988, it was holding 700 light tons against the initial capacity of 3,800 light tons. Meanwhile, an expenditure of Rs.2.57 lakhs was incurred on the watch and ward of the vacant storage buildings upto September 1987. The total expenditure incurred on the execution of the project upto January 1988 was Rs.673.82 lakhs. It was anticipated in September 1988 that its completed cost would be Rs.712 lakhs.

The sanction for Phase I of the project included, *inter alia*, the construction of type 'A', 'B' and 'C' quarters. The lowest tender for the work received in October 1982, was for Rs.121.93 lakhs which included certain conditions unacceptable to the project authorities. Consequently, the tenders were reissued in November 1982, in response to which the lowest offer received was Rs.133.89 lakhs. As the rate obtained in the first call was considered reasonable relative to that of the second call, approval of the Ministry for acceptance of the conditional offer which was valid till the end of January 1983 was sought in December 1982. Although this was approved by the Ministry in January 1983, no contract was concluded. Later, in November 1984, the sanction was amended to provide for the construction of the quarters in four storeys instead of two. Revised tenders were received in June 1985 and the lowest offer was Rs.184.74 lakhs. The Ministry, however, recommended re-tendering. The tender was, therefore, issued for the fourth time in August 1986 and the lowest quotation was Rs.186.46 lakhs. This

was considered high and not accepted. Thereafter, tenders were issued again and the lowest offer of Rs.181.61 lakhs received in January 1987 was accepted in June 1987, after obtaining concurrence of the Ministry. Thus, the non-acceptance of the tender of October 1982 and the subsequent delay had not only resulted in an extra expenditure of Rs.59.68 lakhs, but also delayed the conclusion of the contract by more than 4 years.

The sanction also provided Rs.1.21 lakhs for the construction of a traffic rotary at the junction of the approach road to the NAD and the National Highway. The work was to be carried out by the National Highway authorities as a deposit work. An amount of Rs.1.21 lakhs was deposited in October 1980 and Rs.0.17 lakh was deposited in August 1983. The work, however, did not commence and the National Highway authorities revised their estimates to Rs.4.25 lakhs. Because of the escalation in the estimated cost, the necessity for the traffic rotary was reconsidered and accepted by the Naval authorities. Pending sanction of the revised estimates, Rs.1.38 lakhs continued to remain deposited with the National Highway authorities.

Single accommodation alongwith a Mess for 35 Non-Commissioned Officers (NCOs) of the Military Engineer Services was constructed at a cost of Rs.1.94 lakhs as a part of the project. Furniture worth Rs.0.33 lakh was also procured. However, the authorised strength of the NCOs was only 11 against which the posted strength was seven. Accordingly, the Mess was not being used. The accommodation built was stated to be in use as office/storage accommodation and the furniture was kept in store. Clearly, the strength of the NCOs did not justify the expenditure of Rs.2.27 lakhs.

The Ministry stated in September 1988 that the storage of explosives at the NAD could not commence till March 1988 as there was delay in according sanction for the security personnel.

In sum, the NAD sanctioned in January 1977 had not become fully functional as a depot by September 1988 even though expenditure of Rs.673.82 lakhs had been incurred on Phase I of the project indicating lack of adequate planning and delay in taking decisions.

28. Unauthorised construction of married accommodation

In April 1983, Naval Headquarters sanctioned the provision of a static test yard for the Naval Inspection Organisation at Visakhapatnam at a cost of Rs.14.88 lakhs subsequently revised in March 1987 to Rs.15.38 lakhs. A contract for the execution of the work was concluded by a Commander Works Engineer (CWE) in January 1985 at a total cost of Rs.7.04 lakhs which included all the items of work except provision of water coolers costing Rs.0.04 lakh and furniture costing Rs.0.47 lakh. The work commenced in February 1985 and was completed in March 1986.

According to regulations of the Military Engineer Services, in the case of a project costing Rs.1 lakh or more, if the amount of accepted contract reduces the sanctioned cost of the project by 15 per cent, the sanctioned cost should be reduced by the amount exceeding 15 per cent. The sanctioned cost of the project should, therefore, have been reduced by Rs.6.74 lakhs. On the contrary, the Garrison Engineer (GE) executing the project concluded two agreements in March 1985 with another contractor for the construction of a site office and a storage accommodation at a cost of Rs.6.40 lakhs at a location 12 kilometers away from the project site. The drawings appended to the contracts although indicated as storage accommodation were, in fact, to be married accommodation. The contractor completed the work in December 1985 and the CWE issued orders thereafter reappropriating the storage and site office accommodation to type V married accommodation without any

alterations and allotted both the quarters to his staff officers, who occupied them in January 1986.

The Ministry of Defence stated in October 1988 that the GE had exceeded his authority in utilising project funds and that a departmental enquiry has been ordered.

The case reveals financial impropriety and poor budgetary control in as much as project estimates were inflated abnormally and the savings unauthorisedly utilised for construction of married accommodation, though concealed as storage accommodation.

29. Procurement of unsuitable steel bars

In December 1985, an indent was placed on a public sector undertaking for the supply of 14,250 metric tonnes (MT) of hot rolled deformed steel bars (HRD bars) by Military Engineer Services (MES) authorities. The use of HRD bars in lieu of Tor steel was subject to the following restrictions:

- Not to be used as re-inforcement in structural concrete in Seismic Zone V.
- Not to be used in structures subjected to dynamic loading like gantry girders, bridges, machine foundations, etc.

The HRD bars indented were to be supplied to MES divisions to be nominated by Chief Engineers (CE) mentioned in the indent. A MES division located at Cochin received 1,733.6 MT HRD bars costing Rs.98.60 lakhs during the period March to June 1986. Subsequently, in January 1987, the Commander Works Engineer (CWE) at Cochin reported that HRD bars could not be used by the MES division because the major works being executed were subjected to dynamic loads. Thereafter, in May 1987 also, the CWE reported that the HRD bars were not pliable and could not be bent or straightened with normal effort. The report further stated that, in many cases, the bars even got sheared. The CWE did not recom-

mend the HRD bars for use in slabs and beams. Therefore, the entire stock was declared surplus in April 1987. After either utilising or transferring 200 MT the balance quantity of 1533.6 MT costing Rs.86.25 lakhs was being held in stock (October 1988). An avoidable expenditure of Rs.0.71 lakh had been incurred on the transfer of 127.29 MT alone to two MES divisions at Trivandrum and Goa.

Another CE at Bombay also received a quantity of 1266.45 MT HRD bars in 1986. It was reported by the CE that the bars cracked when bent to 90 degrees. The CE, therefore, proposed to utilise smaller sections of the HRD bars in certain constructions. A quantity of 200.47 MT was utilised by the CE upto the end of August 1988 and the balance of 1,065.98 MT costing Rs.63.95 lakhs was being held in stock. The Ministry of Defence stated in August 1988 that the HRD bars were procured due to non-availability of Tor steel at that time. It was not explained, however, as to why they were procured for construction for which they were not suitable.

The case revealed procurement of HRD bars without determining their suitability for use in Defence projects. This procurement has resulted in a stock of 2,599.58 MT HRD bars worth Rs.150.20 lakhs being held for more than two years without any foreseeable utilisation.

30. Procurement of spares for power generating equipment

In June 1982, Eastern Naval Command had sanctioned the provision of standby generating sets for water supply installations at Visakhapatnam, at an estimated cost of Rs.35.93 lakhs including Rs.28.52 lakhs for the supply and installation of three diesel powered generating sets alongwith maintenance spares for two years. Subsequently, the Commander Works Engineer, Visakhapatnam, concluded a contract in February 1983 for the supply and installa-

tion of three generating sets at a cost of Rs.18.11 lakhs without spares. The generating sets were installed during February 1983 and November 1984 at three locations.

Instead of identifying the spares required and concluding a contract for their supply, the Garrison Engineer (GE), (Naval Depot), who executed the work, separately procured the spares, valuing Rs.13.15 lakhs through 68 supply orders during the period February to July 1985. The supply orders were placed by the GE by splitting the purchases to bring them within the ambit of financial powers delegated to him. The spares procured included 99 items valuing Rs.3.50 lakhs for the installation at the Naval base area which was under the maintenance jurisdiction of the GE (Naval Base). This included the spares valuing Rs.1.13 lakhs purchased in July 1985 by the GE (Naval Depot) after the handing over of the installation in May 1985 to the GE (Naval Base). However, the spares valuing Rs.3.50 lakhs for installation at the Naval Base area were not handed over to the GE (Naval Base). Consequently, the GE (Naval Base) separately procured 70 items of spares under his delegated powers valuing Rs.2.62 lakhs through 16 different local purchase orders during November 1985. Thus, against the total cost of Rs.18.11 lakhs for the installation of the three standby generating sets, two years maintenance spares worth Rs.15.77 lakhs were purchased till November 1985 and during the two years upto December 1987 spares valuing Rs.0.46 lakh only were utilised. The Ministry of Defence stated in September 1988 that the procurement of spares was based on anticipated requirements and that no action was required to be taken against the GEs who acted within their powers.

The case, however, reveals injudicious procurement by two GEs by splitting orders for two years maintenance spares valuing Rs.15.77 lakhs without determining the actual requirement in co-ordination with

each other. In fact, the utilisation pattern of the spares suggests the absence of any rationale for these purchases.

31. Procurement of a crane for a wharf

In March 1980, the Ministry of Defence (Ministry) sanctioned the provision of a 20 Ton crane (crane) at a Naval Wharf at an estimated cost of Rs.80 lakhs. The crane was to provide shore support for repairs and maintenance of naval ships. A contract with a firm for the manufacture, supply and erection of the crane at a cost of Rs.72.11 lakhs was concluded in December 1982 by the Director General of Supplies and Disposals. The delivery date specified in the contract was March 1984, which was later extended to December 1986.

While obtaining sanction for the crane, the Naval Headquarters (HQ) had stated that the wharf had a suitable track for operating the crane. However, the firm reported in December 1983 that the existing track would not take the load of the crane under fabrication and suggested that it be changed. Further, in April 1984, it was noticed during a field inspection that the distance between the two rails of the track was different from that indicated in the contract with the firm. On being advised of this, the firm informed the Naval HQ that the design of the crane was almost ready based on the information detailed in the contract, and that it would have to be redesigned upto its portal level so as to readjust it for use on the existing track. An additional amount of Rs.2.22 lakhs was allowed to the firm on this account in September, 1985.

Meanwhile, in September 1984, a Board of Officers recommended removal and re-laying of the entire track. Accordingly, the Naval Command concerned sanctioned in August 1985, special repairs to the track at an estimated cost of Rs.12.14 lakhs which was later increased to Rs.12.78 lakhs in January 1986. The work which was due to be completed by September 1987 was actu-

ally completed in April 1988 at a cost of Rs.12.26 lakhs.

The crane was delivered by the firm during January to March 1986. The erection and commissioning of the crane has not yet been completed by the firm (September 1988). Meanwhile, the firm has been paid Rs.69.77 lakhs being the cost of the crane. In the absence of the crane, the Navy continued to hire crane facilities and the hire charges paid from March 1984 to March 1988 amounted to Rs.4.17 lakhs. Clearly, the additional expenditure of Rs.6.39 lakhs on account of redesign of the crane and the hire charges was avoidable. Equally, inadequate assessment of the track led to an asset worth Rs.69.77 lakhs lying idle for two years. No enquiry has been held in this matter.

PROVISIONING

32. Over provisioning of synthetic resin

Based on an annual review of demand (ARD) for 1979-80, the Naval Headquarters (HQ) raised an indent in January 1980 on the Controllerate of Procurement (CPRO), Bombay for the procurement of 14,900 litres of oil modified synthetic resin (resin). In September 1980, the CPRO concluded a contract for the supply of 14,900 litres of the resin at a cost of Rs.2.40 lakhs. The supply against the contract materialised between January and March 1981.

A scrutiny of the ARD for resin revealed that there was no consumption during 1977-78. Even though the stock in 1979-80, including dues-in, was in excess of the requirement by 15,075 litres, a quantity of 30,000 litres was added, as Professional Officers' Estimate (POE), thereby projecting a quantity of 14,900 litres for procurement. The Ministry of Defence (Ministry) stated in November 1988 that the annual consumption level in the ARD during the years 1978-79 and 1979-80 had not been

correctly worked out. The POE figure of 30,000 litres was an adhoc estimate, based on higher consumption during the years prior to 1977-78.

However, the average annual consumption of the resin during the period from 1978-79 to 1985-86 was 1745 litres and, thereafter, 160 litres was issued during 1987 and 400 litres upto March 1988. In June 1988, the stock of resin held was 47,609 litres costing Rs.7.97 lakhs. According to the Ministry, utilisation of the resin had ceased due to lack of spare capacity to manufacture oil based paints.

Thus, incorrect provisioning of resin had resulted in the Navy holding a stock of 47,609 litres of resin, costing Rs.7.97 lakhs for over seven years, for which there was no demand due to lack of spare capacity to manufacture oil based paints.

33. Procurement of hospital equipment

Armed Forces Medical Specialists had recommended in March 1976 the procurement of two scanners from a proprietary foreign firm (firm). Subsequently, based on an indent of August 1976 by the Director General, Armed Forces Medical Services, the Directorate General of Supplies and Disposals (DGSD) concluded a contract in April 1977 with the Electronic Trade and Technology Development Corporation (ETTDC), a public sector undertaking, who were the agents of the firm, for the supply of two scanners with accessories at a cost of Rs.8.86 lakhs. The scanners were installed in August 1977 at hospitals in Delhi and Bombay.

It was noticed that the scanners broke down frequently after installation. These could not be attended to by ETTDC. Engineers of the firm also could not repair the equipment to the satisfaction of the users. The scanners, therefore, remained non-functional since their installation. Eventually, the DGSD was compelled in February 1987

to request ETTDC to remove the scanners and to refund the 90 per cent payment made between 1978 and 1983 amounting to Rs.7.97 lakhs. This has not happened and the scanners continue to be held by the hospitals without any use.

The scanners had technological limitations. ETTDC, who had supplied them, confirmed that the scanners recommended by the Armed Forces Medical Specialists were obsolescent and their production had, in fact, been stopped by the firm in 1976. The Ministry of Defence stated in June 1988 that the scanner of a reputed supplier was selected after ascertaining the performance of earlier models. It appears, however, that apart from obtaining the views of a specialist and ascertaining the performance of an earlier model, there were no prescribed technical and formal procedures for the procurement of such equipment.

The case reveals an infructuous expenditure of Rs.7.97 lakhs. It also points to the need for ensuring that technological considerations are not lost sight of in proprietary purchases and that secure arrangements are made for the post-installation maintenance of vital medical equipment.

34. Procurement of life expired paint

Based on Naval Headquarters' (HQ) indent of February 1980 the Controllerate of Procurement, Bombay concluded a contract in January 1981 with a firm for the procurement of 30,000 litres of anti-corrosive chocolate paint (paint) at a cost of Rs.9.75 lakhs. The paint was required to protect the hulls of ships immersed in sea water. The shelf life of the paint is 6 months in tropical climate and as per the terms of the contract the stores carried a warranty against defective material and performance for a period of 12 months from the date of receipt by the consignee. One lot of 4,040 litres of paint costing Rs.1.47 lakhs which was manufactured between July and August 1982, was inspected by the inspecting officers during September

1982 and January 1983. Even though a quantity of 3,040 litres was found to be inferior in resistance to sea water, it was accepted in February 1983 under deviation with a price reduction of 7 per cent. The paint, after acceptance, was despatched in February 1983 and was received by the Naval Store Depot (NSD) in March 1983.

As the shelf life had expired at the time of receipt of the paint, the firm was asked by the NSD in April 1983 to replace the stores. However, the life-expired paint was not tested to establish its unserviceability for rejection as per the terms of the contract. The firm did not replace the paint (April 1983) on the ground that it was found suitable during inspection. Subsequently, in November 1985, the paint was tested by the NSD and it was found to be unsatisfactory due to poor corrosion resistance. Therefore, in January 1986, Naval HQ decided to regularise the loss in case recovery from the firm was not feasible. In April 1986, Naval HQ commented that the case was not accorded the priority and seriousness it deserved and no action was taken by the consignee to test the paint to establish its unserviceability and final rejection under the 'Consignee's right of rejection' clause within the warranty period.

Finally, after over four years of the expiry of its life, the NSD brought the paint on charge in August 1987 and issued the unserviceable paint for normal use.

The Ministry stated in September 1988 that the loss was not regularised as the paint was utilised.

The case revealed laxity in inspection, in that the paint costing Rs.1.10 lakhs required for anti corrosive use was accepted after the expiry of its shelf life even though it lacked anti-corrosive properties.

35. Procurement of equipment for Antarctica expedition

In October 1983, the Ministry of Defence (Ministry) sanctioned the procurement of two sets of emergency floatation gear (EFG) with accessories for fitment on certain Naval helicopters. The equipment was required to be used for the third Antarctica Expedition (expedition) of 1983. Accordingly, the Supply Wing (SW) of an Indian Mission abroad concluded a contract in November 1983 with a foreign firm for supply of this equipment by 20th November 1983. The contract price was Rs.8.68 lakhs in free foreign exchange (FFE).

The EFG were received after a delay of 11 months in October 1984. According to the Ministry, the reason for the delay was that installation parameters and technical specifications had to be finalised since the kits offered by the firm were suitable for direct fitment on the French manufactured helicopters but not on the helicopters manufactured by Hindustan Aeronautics Limited (HAL). This factor was, evidently, not taken into account at the time when the need for the equipment for the third expedition was stated.

Thereafter, two helicopters were made available to HAL for fitment only in July and October 1985. At that stage too, certain trials remained incomplete for want of facilities and technical knowhow. The Ministry stated in August 1988 that the helicopters were generally made available a few months in advance of the expedition which commenced in November each year. It did not state, however, as to why deficiencies persisted in facilities and technical knowhow.

The EFG thus procured and installed at a total cost of Rs.9.78 lakhs (Rs.8.68 lakhs in FFE) could be used only during the fifth and sixth expeditions.

While conducting trials in November 1986 for reuse of the EFG's for the sixth ex-

pedition, it was found that their float assemblies were manufactured in 1977. During the subsequent expedition, in 1987, it was found that these assemblies had developed leaks and tears on the seam joints. Hence, they were declared unfit for use and two further sets were procured in September 1987 for the seventh expedition at a cost of Rs.4.86 lakhs in FFE.

Naval Headquarters stated in May 1988 that the firm had been approached to indicate the reasons for supply of old stock even though unused. The fact that Naval helicopters were used without EFG equipment during the third and fourth expedition is indicative of avoidable risks having been taken as a result of unsatisfactory induction planning and implementation. Also, the procurement of EFG with old stock float assemblies, resulted in an extra expenditure of Rs.4.86 lakhs in FFE.

36. Procurement of defective stores

Marker Man Overboard (MMOB) is used by ships for marking the position of crew who may have fallen overboard and to facilitate search and rescue operations. Based on a technology of the 1960s, this equipment was successfully designed and tested by a Defence Research Establishment (DRE) and cleared for introduction by the Navy in December 1972.

The Department of Defence Supplies (DDS) placed an order in September 1978, after a delay of over five years, on a firm for the supply of 1,000 MMOB empties at a cost of Rs.4.79 lakhs. The supplies were inspected by the Navy and accepted in March and May 1980 even though the inner diameter of the empty was higher than the upper limit specified in the drawings. The DDS had also placed orders in March 1978 for the supply of 6,000 sea water activated cells (cells) on two firms at a total cost of Rs.6.30 lakhs. These cells are an integral part of the equipment and are employed at the rate of six per MMOB. However, only 3,162 cells

had been received.

In the meantime, Naval Headquarters (HQ) raised an indent on the Director General, Ordnance Factories (DGOF) in August 1979 for the filling of the empty MMOBs at an estimated cost of Rs.1 lakh. The ordnance factory concerned stated in February 1982 that the performance of the first four pilot samples of 100 MMOBs was not satisfactory and that the equipment had been rejected by the Naval Inspecting Authorities. However, in order to meet the Navy's urgent requirements, 89 MMOBs were accepted under concession in April 1982. Subsequently, in January 1984, the DRE informed the Inspection Authorities that on account of excessive variation in the internal diameter of the empty, the MMOBs were not suitable for filling. Efforts to productionise the items continued until it was realised in April 1986 that the life of the cells had already expired. The case was re-examined by the DRE in September 1987 and it was concluded that any further modification to the design of the MMOB would cost much more than the production of the empties. Accordingly, it was recommended that the existing empties be filled and accepted with all concessions and used for practice purposes only.

The Ministry of Defence (Ministry) stated in September 1988 that the design of the MMOB did not lend itself to mass production as revealed by trials. The Ministry also stated that proposals to utilise 911 MMOBs valued at Rs.4.37 lakhs and 2,628 life expired cells valued at Rs.2.76 lakhs were under study. Meanwhile, 300 MMOBs valued at Rs.9.30 lakhs were purchased by the Navy locally between April 1981 and April 1987 to meet their urgent, operational requirements.

Thus, the productionising of MMOBs without satisfactory proving trials resulted in an infructuous expenditure of Rs.7.44 lakhs. It also led to the Navy being allowed to meet

only its emergent requirements of this vital, life-saving equipment.

37. Avoidable expenditure due to delay in acceptance of tender

Naval Headquarters (HQ) raised an indent in January 1984 on a Central Purchase Cell (CPC) for arranging procurement of 3,31,200 Kilograms (Kg) of waste cotton coloured at an estimated cost of Rs.11.59 lakhs. According to the Tender Notice, the last date for the receipt and opening of tender was 25th April 1984. The tenders were to remain valid for acceptance till 25th June 1984. In response to the tender enquiry, five firms submitted quotations. Firm 'A' which quoted the lowest rate of Rs.3.49 per kg indicated in the quotation that its offer was valid upto 5th May 1984 subject to extension. In May 1984, the CPC forwarded the quotations from the firms, comparative statement of tenders and the indents to Naval HQ for consideration of the Tender Purchase Committee (TPC). However, the validity period of the lowest tenderer (firm 'A') had expired. Though the quotation of Firm 'A' was valid upto 5th May 1984 subject to further extension, the firm was not requested to extend the validity period of their offer, inspite of a mention made in the tender notice that the tender would remain open for acceptance upto 25th June 1984.

The TPC took up the case for consideration only in September 1984 and communicated its approval to the CPC in October 1984 for the procurement of 3.31 lakh kgs of waste cotton coloured from firm 'A' at a cost of Rs.12.02 lakhs. In the meanwhile, Naval HQ approached firm 'A' in September 1984 with the request that since the case was under consideration of the TPC the validity of their offer be extended upto 15th October 1984. Firm 'A' did not agree.

Thereafter, in January 1985, Naval HQ, asked the CPC to retender the item in the normal manner. The waste cotton was finally procured between February 1986 and

January 1987 from two firms at the rate of Rs.5.00 and Rs.5.35 per kg at a total cost of Rs.17.37 lakhs.

The Ministry of Defence stated in October 1988 that the acceptability of the offer of firm 'A' as a valid tender was doubtful and thus liable to rejection. However, if this was so, there should have been no occasion for Naval HQ to request firm 'A' to extend the validity of their offer in September 1984 or for the TPC to recommend its offer in October 1984. Further, the Ministry did not indicate why the second lowest offer of firm 'B' at Rs.4.40 per kg which would have saved an avoidable expenditure of Rs.2.80 lakhs was not accepted.

It was seen that a lapse in the timely request to firm 'A' for an extension of validity date together with an inordinate delay of more than 18 weeks in finalising the tender led to an avoidable expenditure of Rs.5.35 lakhs.

OTHER CASES

38. Modification of plotting tables on certain ships

The plotting table fitted on board certain Naval ships (Kamorta class) had various operational constraints. Its modification was considered absolutely essential on account of the constraint that the existing table imposed during the conduct of a certain type of operation. The Central Scientific Instruments Organisation (CSIO) confirmed, in October 1978, that the table could be modified to standards prescribed by the Naval Headquarters (NHQ) and agreed, in April 1980, to so modify one table at a cost of Rs.4 lakhs. This was sanctioned by the Ministry of Defence (Ministry) in September 1980 after the NHQ had assured it that the mandatory approval of the Naval Equipment Policy Committee (NEPC) to the modification would be obtained before the work was taken up on all ships.



Kamorta Class Ships

In April 1980, the prototype was estimated to be developed by the CSIO within 1 1/2 years of the sanction of the budget and the modification work to all ten ships was to be completed by the end of 1983. The prototype was, however, developed by the CSIO only in March 1984 after a delay of 23 months and installed on a ship in May 1984. The trials were proven in December 1984 and NHQ decided in March 1985 to introduce the modification kits on the remaining ships. Meanwhile, in January 1985, the CSIO quoted a rate of Rs.3.3 lakhs per unit for the supply of additional units. The quotation remained valid upto 31st October 1985.

In spite of the assurance given by Naval HQ in August 1980 to the Ministry that NEPC's approval would be obtained before implementing the modification in all the ships, it approached the Ministry on 16th March 1985 for approval to the procurement of modification kits to all the ships without NEPC's approval. This was not agreed to by the Ministry which insisted on prior NEPC clearance. Naval HQ finally obtained NEPC's approval in October 1986. On the two year delay in obtaining NEPC's approval, the Ministry stated in July 1988 that the NEPC meets at infrequent intervals and does not meet to decide individual cases. The fact, however, remains that there was a meeting of the NEPC in July 1985 and the Naval HQ could have utilised this opportunity. Thereafter, in January 1987, a revised quotation was obtained from the CSIO in which the rates were revised upwards from Rs.3.3 lakhs to Rs.3.785 lakhs per unit. In addition, Rs.17.24 lakhs were sought towards escalation, transportation, insurance charges, etc. The Ministry's approval for the procurement of 23 units of modification kits at an estimated cost of Rs.103.5 lakhs was given in June 1987. The supply is expected to be completed by June 1990.

The Ministry stated in July 1988 that the modification was required to make the use of the table more convenient. However,

while justifying the modification in June 1980, it was stated that certain operational drawbacks would be overcome if the modifications were carried out.

In summary, delays in developing the modification, compounded by delays in obtaining NEPC's approval imposed a handicap during the conduct of certain operations by nine ships for a major portion of their life. Two such ships were, in fact, decommissioned in July 1986 and June 1987 and in the case of two other ships it was decided not to implement the modification as they were nearing their decommissioning. In addition, based on the existing sanctions, there will be an avoidable expenditure of Rs.18.97 lakhs when the supply is expected to be completed by June 1990.

39. Procurement and utilisation of heavy duty tractors

In August 1978, the Ministry of Defence (Ministry) accorded sanction for the procurement of three heavy duty tractors together with three years spares at a cost of Rs.12 lakhs for towing a certain number of Naval aircraft. The requirement was considered urgent, operational and inescapable, as the two tractors then in use were unreliable and inadequate and were considered to be potential flight safety hazards. The indent for the procurement of three tractors was raised by Naval Headquarters (HQ) in August 1978 on the Supply Wing of an Indian Mission (SW) abroad. The SW concluded a contract in November 1978 for the supply of three tractors with spares at a total cost of Rs.11.16 lakhs including free foreign exchange (FFE) of Rs.10.64 lakhs. The tractors were received by the Naval establishment at stations 'A' and 'B' in July 1979. However, the spares valuing Rs.0.85 lakh which were shipped in July 1979 were lost in transit due to a fire in November 1979. The loss had not been regularised till September 1988.

The procurement of the three trac-

tors for replacement of the two tractors notwithstanding, Naval HQ separately sanctioned in August 1979 the procurement of two heavy duty tractors with three years spares at a cost of Rs.9.92 lakhs though the number of aircraft remained the same. These tractors were procured from the same foreign firm by the SW at a cost of Rs.8.16 lakhs (in FFE) under a contract of December 1979 and were received by the Naval establishment at station 'A' in September 1980 and November 1982. The spares for the tractors were received in January 1981. The procurement of two tractors separately resulted in an extra expenditure of Rs.0.79 lakh.

The tractor received at Station 'B' became unserviceable in February 1981 and could not be repaired due to the non-availability of critical spares. The requirement of spares was not assessed properly and led to haphazard procurement. Twelve items of critical spares demanded in June 1981 were indented for by Naval HQ in June 1983, contracted by the SW in July 1983 and received in November 1983. Thereafter, a further eight items were considered critical in September 1985, and included in a second list of 49 items of spares which were sanctioned for procurement by the Ministry in December 1986 at a cost of Rs.0.96 lakh. Although scheduled for delivery by January 1987, the spares were received in March 1988. As a consequence, two tractors procured in 1979 and 1980 for the Naval establishment at station 'A' were cannibalised in order to make others serviceable. The two cannibalised tractors have been unserviceable since September 1982 and July 1987.

The non-availability of critical spares adversely affected the performance of the tractors. The Naval establishment at station 'B' used the tractor for only seven months out of a total period of 104 months (upto March 1988) due to unserviceability of the tractor for want of spares. Similarly, one tractor was in use at station 'A' for only 15 months out of 90 since its receipt in Septem-

ber 1980. This tractor had remained unserviceable since September 1982. The other three tractors were used, cumulatively, for a total period of 166 months against 273 months available upto March 1988. According to Naval authorities, the non-availability of the tractors had been causing difficulties in the day to day functioning of the Naval establishment, and the requirement was met by utilising more than one light duty tractor in a combined effort and by employing additional manpower.

It was also noticed that the contracts of November 1978, December 1979 and July 1983 concluded by the SW for the supply of the tractors and spares included five per cent commission amounting to Rs.0.95 lakh payable to the Indian agents of the foreign firm. However, the agents were neither involved in negotiating the contract nor was there any evidence of their having rendered any service.

In summary, five heavy duty tractors purchased at a cost of Rs.19.32 lakhs (FFE: Rs.18.80 lakhs) to meet an inescapable operational requirement were used sub-optimally for a period of 188 months out of a total period of 467 months upto March 1988 mainly on account of an avoidable mismatch between the procurement of the tractors and related spares. Clearly, with better spares management the Navy could have managed more efficiently with three tractors and avoided the import of two tractors.

40. Loss due to delay in raising discrepancy reports

Spare parts for the maintenance of a naval aircraft were being obtained from a foreign country in terms of a contract signed in 1975 and supplementary agreements concluded thereafter. According to the working protocol of November 1981 between the Government of India and the foreign country, discrepancy reports for stores short received were to be raised within 90 days

from the date the stores arrived in India.

Three consignments of spares were received between November 1981 and January 1982 by a Naval Store Depot (Depot). Verification of the stores revealed certain deficiencies valued at Rs.2.09 lakhs. However, an initial notification about the deficiencies was sent to the foreign supplier in respect of only two consignments after four and six months of receipt respectively. Discrepancy reports for the deficient spares were raised only in October 1983 and January 1984, 20 and 26 months after the receipt of the consignments. Due to the delay in raising the discrepancy reports, the claim of Rs.2.09 lakhs for the stores short received was rejected by the foreign supplier. Naval Headquarters, therefore, decided in May 1985, to regularise the loss. This was yet to be done (August 1988). Part of the deficiency valued at Rs.1.67 lakhs was subsequently made good by importing spares and sub-assemblies at a cost of Rs.3.28 lakhs.

The Ministry of Defence (Ministry) stated in August 1988 that deficient spares which were interchangeable were not imported. According to the Ministry, the delay in raising the discrepancy report was not due to a lapse on the part of any individual. It agreed, nevertheless, that the loss of Rs.2.09 lakhs and the additional expenditure of Rs.1.61 lakhs was avoidable.

41. Construction of patrol vessels

A particular class of patrol vessels (vessels) are used by the Navy in the Coastal Defence role. Based on an assessment of the force level of these vessels required to be maintained in the 1980s and 1990s, the Ministry of Defence (Ministry) had approved in January 1982, the construction of four vessels in Public Sector Undertakings (PSU) 'M' and 'N' at an estimated cost of Rs.120 crores. The first two vessels were to be constructed at PSU 'M' and the next two at PSU 'N'. The delivery of the vessels was expected to commence from 1986 and was to

be completed by 1990. The delivery schedule indicated was crucial to maintain the required force level of the vessels.

A Naval Design Organisation had designed the vessel around technology 'D' propulsion. This concept was retrograde in as much as similar vessels acquired in 1966 and 1971 had partial technology 'E' as its propulsion package and the Ministry had accepted in 1979 a proposal of the Navy to have all future ships based on the technology 'E' propulsion system as this was cost effective and more efficient. In July 1982, the staff requirements of these vessels were subjected to a detailed analysis by Naval Headquarters (HQ). The analysis had indicated that patrol vessels of the future needed a speed of over 30-35 knots for undertaking strike missions as well as for ensuring survivability. In view of the fact that the vessels were designed around technology 'D' propulsion and it was not possible to get sustained speeds in the region of 30-35 knots, it became apparent that it would be necessary to opt for technology 'E' propulsion for these vessels. The Navy, however, persevered with the technology 'D' concept as a major change to technology 'E' propulsion would, in its view, warrant complete re-designing of the vessels for which approximately 24 months were required after finalisation of the package.

Eventually, however, as Naval HQ were concerned about the depletion in force levels that would occur by 1987 and in order to ensure that PSU 'M' was full up with the work load, it was proposed that the construction of the first two vessels be undertaken on the existing design and that the remaining vessels be redesigned for taking technology 'E' engines. However, the Ministry took a decision in April 1983 to go ahead with the production of four vessels on the existing design around technology 'D' propulsion as changing to technology 'E' propulsion might cause slippage in induction apart from an increase in cost. The estimated cost of con-

struction was increased to Rs.201.72 crores on account of additional weapons and sensors to be fitted in these vessels and escalations due to inflation during the intervening period. The vessels are expected to be delivered from 1989-90 onwards at the rate of one vessel every year. Clearly, therefore, the Navy will have to accept a serious gap in force availability apart from being equipped with vessels which will have operational limitations. The Ministry stated in August 1988 that the vessels would have no operational limitations when compared to the Staff Requirements. The fact, however, remains that when the Staff Requirements, frozen in mid 1980, were subjected to detailed analysis in July 1982, it was found that the design formulated around the technology 'D' concept was below the desired operational standards. While approving the construction of four vessels around technology 'D' engine, it was decided by the Ministry to identify a suitable technology 'E' engine and to design subsequent vessels capable of producing the desired speed. However, Naval HQ proposed in June 1986 the construction of 4 additional vessels also of the same design with technology 'D' propulsion on the plea that this would provide commonality and ease of maintenance. This proposal was approved by the Ministry in July 1986 at an estimated cost of Rs.230.84 crores. These vessels are expected to be delivered from late 1991 onwards. Thus, contrary to the objective of upgrading the performance of these vessels by adopting technology 'E', the Navy will be acquiring and operating at the turn of the century, patrol vessels which fall short of desired operational standards.

The identification of the engine and its procurement were also flawed leading to avoidable expenditure. The vessel was designed around engine 'P' manufactured in country 'X'. This implied pre-selection and limited competition severely. An unusual procedure for the selection of the engine followed. Quotations were invited (Decem-

ber 1982) from two foreign firms viz. firm 'A' of country 'X' and firm 'B' of country 'Y' for their engines 'P' and 'Q' respectively through their local agents. While the firm staff requirement projected to firm 'A' was for a single engine per shaft, that to firm 'B' was for two engines per shaft. When the representatives of firm 'B' met authorities in Naval HQ and the Ministry in April 1983, they were informed that the two engines per shaft configuration offered by them could not be fitted on the vessels without re-design. The firm offered to re-design the vessels at their cost within four months. This was, however, not accepted and the Ministry requested firm 'B' to submit its quotation for a single engine per shaft configuration. This was received and the Naval HQ, after evaluation of all proposals, came to the conclusion that there was little to choose between the offers of the two firms. The Naval HQ, however, suggested to the Ministry in June 1983 the acceptance of the offer of firm 'A' on account of a lower maintenance effort. The Ministry did not accept this position and observed in June 1983 that the offer of firm 'B' was superior in respect of practically all parameters. The Ministry advised Naval HQ to select an engine with an endeavour to standardise the kind of engine being used as a step towards the eventual production of different types of the engines in the country to meet various user needs. The Ministry also directed that different types of engines in use be studied from the technical and financial angles before taking a final decision. The Naval HQ, however, maintained that the type of engines installed in warships do not have commercial use and a fresh examination of the engines should not be insisted upon. This was accepted by the Ministry without any reasons being assigned for its having resiled from its earlier conclusion that the offer of firm 'B' was superior. The Ministry stated in August 1988 that firm 'B' was invited to tender only for purposes of competition. It did not explain, however, as to how competition between two suppliers

who were asked to offer dissimilar equipment could either be engendered or evaluated.

Price negotiations were, thereafter, held with firm 'A'. The price of four propulsion packages offered by firm 'A' was Rs.25.11 crores and that of firm 'B' was Rs.15.62 crores for delivery in 1983 and Rs.16.69 crores for delivery in 1984. Firm 'A' reduced its price to Rs.21.67 crores after negotiation for supply in 1984-85. A contract was concluded with firm 'A' in November 1983 and the sets have been received between September 1985 and December 1986. No penalties were effected for delayed supplies nor any assessment made of the impact of the delays on production and operational preparedness. The Ministry stated in August 1988 that the liquidated damages to be levied for the delayed delivery were negotiated with the firm and penalties to be imposed were adjusted against the sum payable for extending the guarantee period to coincide with the construction schedule of the vessels. However, the financial costs of this adjustment were not indicated. Nor did the Ministry explain as to why the receipt of the engines could not be synchronised with the revised construction schedule as it was aware of the delays at the time of finalising the engine contract. Thus, on account of the selection of engine 'P' of firm 'A' at the design stage itself, the offer of firm 'B' which was techno-economically superior had to be rejected. This resulted in an extra expenditure of Rs.4.98 crores apart from a fruitless procurement exercise.

Clearly, a superior propulsion technology, accepted as such, had been given up and critical parameters diluted on grounds of avoiding delay. In fact, however, the induction of the vessels is currently three years behind schedule. Further, the manner of selection of the propulsion package raises questions not only on the efficiency of the selection procedure but also on the rationale of adopting inferior technology. The

operational handicap thus placed on the Navy merits an inquiry into systems, procedures and responsibilities.

42. Import of Data Bus for certain ships

The Data Bus is a system for exchange of data between digital equipment installed in ships. In modern warfare, the effective fighting capability of a warship under various conditions of damage and failure is determined primarily by the information exchanged between surviving sensors, weapons and control equipment. To enhance this capability, the concept of a Data Bus was conceived by western countries, which allows multiple alternate paths for transfer of information. Besides, this concept was to provide benefits of reduction in manpower, fuel consumption and construction costs.

Three ships of a certain class to be constructed indigenously were to be fitted with weapons and electronic systems of diverse origin. In order to resolve the complex system of its integration and interfacing, a Weapons and Electronic Systems Organisation (WESO) was set up by the Ministry of Defence (Ministry) in July 1978. The expenditure towards system integration was not to exceed Rs.2 crores per ship.

The Data Bus approach for the Naval ships was suggested by the Department of Electronics (DOE) in 1979 and was accepted by the Navy. Thereafter, this class of ship was designed around a Data Bus as suggested by DOE. Later, on examination of DOE's design, it emerged that DOE's Data Bus was, in fact, similar to that of firm 'A' of country 'X'. A WESO team visited country 'X' in June 1980 for conducting technical negotiations with firm 'A'. The team recommended after technical negotiations, the import of Data Bus from firm 'A' at an estimated cost of Rs.1.6 crores per ship. The report of the team was considered by the WESO Steering Committee. It evoked divergent opinions amongst the members of the Committee about the techno-economic

validity of the Data Bus concept. It was decided in June 1981 to resolve the issue by another committee. The committee recommended, in October 1981 the evolution of a precise Qualitative Requirement (QR) against which the Ministry could invite quotations from various firms and for the pursuance of the case by a Negotiating Committee.

A Price Negotiating Committee (PNC) was set up by the Ministry in January 1982. Based on the QR evolved by the Naval Headquarters (HQ) in April 1982, tender enquiries were issued to various firms. Three foreign firms viz. 'A' and 'B' of country 'X' and firm 'C' from country 'Y' responded. Firm 'A' had quoted Rs.6.43 crores, firm 'B' Rs.14.41 crores and firm 'C' Rs.4.59 crores. The technical evaluation of these quotations which was carried out by the PNC in August 1982 had concluded that firm 'A's offer did not meet the QR evolved by the Navy. Further, while the Naval HQ representative in the PNC had preferred firm 'B', the DOE and Defence Research and Development Organisation (DRDO) representatives had preferred firm 'C'. As the PNC could not come to a unanimous decision, the Ministry appointed in December 1982 another committee under the chairmanship of the Chief Controller Research and Development (CCRD) to look into the indispensability of the Data Bus to Naval ships and justification of the high price of firm 'B' vis-a-vis firm 'C'. The CCRD stated in May 1983 that the Data Bus, though highly desirable, was not indispensable and that the offer of firm 'C' which was preferred by DOE and DRDO's representatives was acceptable and met the QR. The recommendation of the CCRD was approved by the Scientific Adviser to Raksha Mantri (SA to RM) in June 1983. Naval HQ, however, did not find this recommendation acceptable and suggested that firm 'A's offer which was dropped earlier by the PNC should be considered for negotiations as firm 'A' had, in the meantime, submitted an improve-

ment to their earlier offer. The Ministry decided in June 1983 to conduct negotiations with all the three firms.

Fresh quotations were called for from all the three firms in April 1984. Firms 'A' and 'C' submitted their quotations in May 1984. While the offers were under examination in the Ministry, a note was issued by the Naval HQ in June 1984 stating that firm 'C' did not meet the QR and that it wanted only the Data Bus of firm 'A'. The note issued by the Naval HQ was discussed by the Ministry in June 1984 and it was decided that firm 'C's offer would be treated as technically acceptable and CCRD would submit a report about firm 'A's offer meeting the QR on the basis of further details to be obtained from the firm. The CCRD along with representatives of DRDO and DOE after discussions with the representatives of firm 'A' came to the conclusion that their offer also met the QR subject to certain amendments promised to be incorporated in the offer. The PNC carried out negotiations with firms 'A' and 'C' in October 1984. The negotiated rate of firm 'A' was Rs.8.38 crores as against Rs.5.32 crores of firm 'C'. Firm 'C' also proposed to sub-contract equipment worth Rs.1.3 crores to Indian manufacturers at its risk. Though the offer of firm 'C' was the lowest and met the QR, the Naval HQ was not prepared to accept this offer. They arranged a meeting with the SA to RM on 29th October 1984. Subsequently, the SA to RM submitted a note opining that the offer of firm 'A' had an edge over that of firm 'C' on technical and user aspect and advised the Ministry to take a decision considering the cost and technical position. As the Naval HQ was vigorously opposing the acceptance offer of firm 'C's offer, the Ministry took a decision in January 1985 to accept the offer of firm 'A'.

A contract was concluded with firm 'A' in June 1985 for the supply of three Data Bus Systems at a cost of Rs.8.29 crores. Though these were scheduled for delivery between April and December 1987, the sets

were actually delivered between March and August 1988. Meanwhile, the three ships have been commissioned without the Data Bus. The retrofit is now (September 1988) planned for October 1988, September 1990 and January 1991 respectively. The Ministry stated in March 1988 that the Data Bus would reduce the cost and time during the half life modernisation.

As an interim measure, equipment costing Rs.1.88 crores had been procured and installed on board the three ships to solve the problems connected with the interfacing of electronic and weapon systems. With the fitment of Data Bus, equipment costing Rs.1.88 crores would be rendered redundant.

Orders had also been placed for the purchase of equipment costing Rs.2.33 crores for two of the ships with an option to place an order for the third set from an indigenous source for interfacing weapons acquired from country 'Z' with the Data Bus being procured from country 'X'.

Meanwhile, in February 1986, Government sanctioned the indigenous development of a Data Bus against the same QR by a Naval Laboratory at an estimated cost of Rs.4.30 crores. The Development and Engineering model of this system has been developed and installed in May 1987 on board one of the ships and was undergoing evaluation trials (September 1988). In view of the fact that the Data Bus was not indispensable, the cost and benefits of importing the equipment and its indigenous development merited analysis.

In sum, the opposition of the Naval HQ to the introduction of firm 'C's Data Bus which was techno-economically acceptable had resulted in incurring an extra expenditure of Rs.2.97 crores in foreign exchange. Apart from reverting to the conventional method, equipment worth Rs.1.88 crores had to be procured as an interim arrangement. The Naval HQ's pre-selection of firm

'A's Data Bus at the design stage, the favouring of firm 'B's offer at the initial stage of negotiations and reverting to firm 'A' at the final stage of negotiations casts doubt on the users requirements as well as evaluation of the Data Bus. The retrofit of the Data Bus received between March 1988 and August 1988, for all the three ships since commissioned in the Navy is now planned for October 1988, September 1990 and January 1991. Meanwhile the indigenous Data Bus developed by a Naval Laboratory on the same QR was undergoing evaluation trials since May 1987. Therefore, if the Navy could afford the delay in installing the imported Data Bus upto January 1991, it could equally have awaited the indigenous development of the Data Bus.

43. Uneconomic indigenous production of a rocket

The Navy's requirement of rockets (practice version) for a particular class of ships was being met by import since 1968 at prices ranging between Rs.2,123 and Rs.5,420 per rocket upto 1982. In order to attempt indigenous manufacture, a Defence Research and Development Establishment designed and developed the rocket by 1977 at a cost of Rs.14.93 lakhs. The rocket was estimated (May 1981) to cost Rs.5,879 each.

In December 1975, Naval Headquarters (HQ) placed a development order on the Director General of Ordnance Factories (DGOF) for the manufacture of 100 rockets by 1976-77 at an estimated cost of Rs.2 lakhs. In March 1977 an indent for the supply of 1,420 rockets at an estimated cost of Rs. 28.4 lakhs was also placed on the DGOF. Because of the failure of the DGOF to effect supply even after 2 years, it was decided in January 1979 to entrust the production to a Public Sector Undertaking (PSU). It was noticed in Audit that these decisions were taken without considering the economics of the proposed indigenous production.

The PSU informed Naval HQ in July

1979 that pending the fixation of a realistic price on cost plus basis, the approximate price would be Rs.0.16 lakh per rocket and that delivery would commence at the rate of 600 per year from June 1981. The quantity ordered was increased to 1,750 rockets in December 1983.

The PSU failed to adhere to its delivery schedule and a revised schedule of 600 per year from 1983-84 was accepted by Naval HQ. Anticipating delay in the supply of rockets by the PSU, 800 rockets were imported at a cost of Rs.42.72 lakhs during May 1981 and August 1982.

As against the price of Rs.0.16 lakh per rocket quoted initially by the PSU and revised to Rs.0.52 lakh in May 1983, the Study Team fixed the cost of the rocket at Rs.0.30 lakh. The cost also included a sum of Rs.7.20 lakhs on account of amortised cost of tools procured by the PSU for the manufacture of the rocket and an avoidable expenditure of Rs.2.29 lakhs on account of 1,750 dummy fuzes originally ordered and subsequently reduced to 80. The cost also included one per cent for contingency besides 7.5 per cent profit. The cost of the facilities in the form of buildings, plant and machinery created by the PSU for the manufacture of the rocket was not, however, amortised. The supplies were completed by the PSU as per the revised delivery schedule and an amount of Rs.5.80 crores paid to it upto March 1988.

The Ministry of Defence (Ministry) stated in September 1988 that out of the ships using the rockets, two had been de-commissioned and three more were due for decommissioning during 1988 to 1990. The average annual consumption of these rockets during 1979 to 1987 was only 86 and Naval HQ stated in March 1988 that there were no proposals to place any further orders on the PSU.

The case reveals that the process of indigenisation of a limited quantity of one-

time requirement of rockets was taken up without adequate study of the costs of such production *vis-a-vis* costs of import. The Ministry stated that import of a similar quantity of rockets would have been cheaper by Rs.4.06 crores. Also, there was avoidable expenditure of Rs.2.29 lakhs on 1,750 dummy fuzes. Lastly, the low utilisation and planned de-commissioning of the ships did not warrant such a large outlay.

44. Payment of demurrage charges

Demurrage charges paid to the Railways by certain Store Depots and Armament Depots of the Navy were examined in Audit and it was noticed that during the period 1982-83 to 1986-87 a sum of Rs.16.40 lakhs was paid. This expenditure revealed an increasing trend. Approximately 88 per cent of the expenditure related to two Depots, viz. 49 per cent by the Naval Armament Depot at Alwaye and 39 per cent by the Naval Store Depot at Visakhapatnam.

Under the provisions of purchase contracts concluded for the supply of urgent requirements by the Ministry of Defence (Ministry) with a foreign Government, the stores, excepting inflammable or poisonous ones, are to be air freighted through the foreign country's airlines (airlines). Since the airlines operate only upto New Delhi, clearing and forwarding has to be done at New Delhi and the stores subsequently despatched to a Naval Store Depot by Indian Airlines. An examination of the clearing and forwarding of such stores indented on the basis of urgent requirements and received through the foreign airlines revealed that there were considerable delays in clearing the stores. Consequently, the Ministry had to pay large sums to the International Airports Authority of India towards terminal, handling and demurrage charges. Such payment during 1987-88 amounted to Rs.3.39 lakhs. According to the Ministry, the delay in clearance was on account of:

non-availability of indent particulars or

the contents of the package in the Airway bills.

- delay in receipt of the Airway bills, and
- absence of specification certificates.

Accordingly, clarifications were to be sought from the foreign Government for filing of the Bill of Entry and this takes between one and four months. This not only results in the payment of warehousing and demurrage charges but also defeats the very purpose for which the stores were airlifted.

The Ministry stated during November 1988 that to eliminate the possibility of delays in delivery as far as stores sent by air were concerned, remedial measures have been taken since November 1987. They have, however, not stated whether action has been taken to avoid payment of demurrage charges to the Railways for which also the Ministry should consider evolving a system for taking timely delivery of goods and avoiding infructuous expenditure.

45. Selection of defective engines

A special class of boats (boats) with the Navy are required primarily for the defence of the approaches to ports and offshore installations against various forms of attack. Construction of the boats, based on a design evolved by the Indian Naval Design Organisation, was entrusted to a Public Sector Undertaking (PSU) in batches. The construction of the first batch of three boats was sanctioned by the Ministry of Defence (Ministry) in November 1972 at an estimated cost of Rs.357 lakhs. The cost was later revised to Rs.443.72 lakhs in May 1973 and to Rs.675 lakhs in August 1976. A contract with the PSU was signed in September 1976. The boats, which were due for delivery between October 1976 and February 1977, were actually delivered between September 1977 and November 1978.

The construction of the second batch of four boats was sanctioned by the Ministry

in December 1975 and an order placed in January 1976 at a cost of Rs.13.38 crores for delivery between December 1978 and August 1979. These were delivered between December 1980 and August 1983.

The Ministry issued a sanction in December 1981 for the construction of three similar boats for the Coast Guard at a cost of Rs.18 crores and concluded a contract in December 1981 with the PSU for delivery between August 1983 and May 1984. In the meantime, two of the boats originally earmarked for the Navy were transferred and commissioned in the Coast Guard in December 1980 and November 1981 respectively.

The engines earmarked for fitment on these boats were manufactured by a foreign firm. The selection of these engines for these boats was made by the Naval Headquarters (HQ). However, the engines did not have a proven record of performance at the time of selection. The Ministry stated that when the engine was chosen it did not have sea service, while its earlier model was giving satisfactory service to the Navy. Twenty four engines were procured for the 10 boats against orders placed in December 1972, November 1976 and July 1978 at a total cost of Rs.8.71 crores.

The boats built by the PSU for the Navy and commissioned from September 1977 onwards had constant engine failures thereby rendering them non-operational from time to time. Therefore, the new engines received for fitment on the boats ordered for the Coast Guard were diverted to the boats commissioned in the Navy for replacing defective engines. Consequently, a situation arose where no new engines were available for fitment on the boats under construction for the Coast Guard. The construction was held up till repaired engines were made available in November 1983, February 1984 and June 1986 for the first, second and third boats respectively. As a result, the first,

second and third boats were delivered by the PSU to the Coast Guard after a delay of 7, 8 and 28 months respectively, from the contracted delivery schedule of August 1983, December 1983 and May 1984. The Ministry stated in November 1988 that the impact of these delays on the training and operational commitments of the Coast Guard had been significant.

The PSU claimed compensation for payment of extra labour charges due to an increase in wage structure, extra expenditure due to occupation of slipways and berths and an additional charge for insuring the boats for the extended period of delivery attributing the late delivery to the non-availability of engines. The Ministry decided in a meeting attended by the representative of the PSU, amongst others, to pay wage escalation for the first half of the period of delay. This amounted to Rs.54.5 lakhs out of a total sum of Rs.273.8 lakhs paid to the PSU in December 1985 and March 1986. In addition, a claim for Rs.1.49 crores was preferred by the PSU to compensate for expenditure incurred on the removal of defective engines, berth hire and slipway charges etc. A sum of Rs.1 crore was paid by the Ministry in March 1987 on an adhoc basis pending final settlement of the claim.

The Coast Guard stated in June 1986 that the engine selection was wrong and was thrust on the Coast Guard by the Navy. The boats delivered to the Coast Guard remain non-operational frequently and even when operational, there are considerable speed

limitations. The Coast Guard are, therefore, considering the question of re-engining the boats lest assets worth over Rs.27 crores continue to be under-exploited. The Coast Guard also apprehend that unless the boats are re-engined they might have to be written off.

Owing to their frequent failures, the engines had to be overhauled prematurely. The Ministry stated in November 1988 that the engines were repaired at a Naval Dockyard and the repair cost was not known. Meanwhile, two engines costing Rs.72.60 lakhs had been declared beyond economical repair (BER), prematurely and two engines costing Rs.72.60 lakhs are lying in a badly damaged condition, awaiting assessment of the damage.

The case reveals that the selection of engines for the boats was defective. Wage escalation amounting to Rs.54.5 lakhs had to be paid to the ship builders due to non-availability of serviceable engines. Against a claim for Rs.1.49 crores by the shipbuilders for compensating the extra expenditure incurred by them due to non-availability of serviceable engines, an adhoc payment of Rs.1 crore was made in March 1987 pending final settlement of the claim. Engines had to be prematurely overhauled due to frequent failures. Four engines worth Rs.145.20 lakhs had been declared BER and badly damaged. Consequently, no spare engines are held, posing a handicap to the Navy and the Coast Guard. The boats could not be exploited to their designed extent.

CHAPTER V

RESEARCH AND DEVELOPMENT ORGANISATION

AIR FORCE

46. Design and development of an inter-services pilotless target aircraft

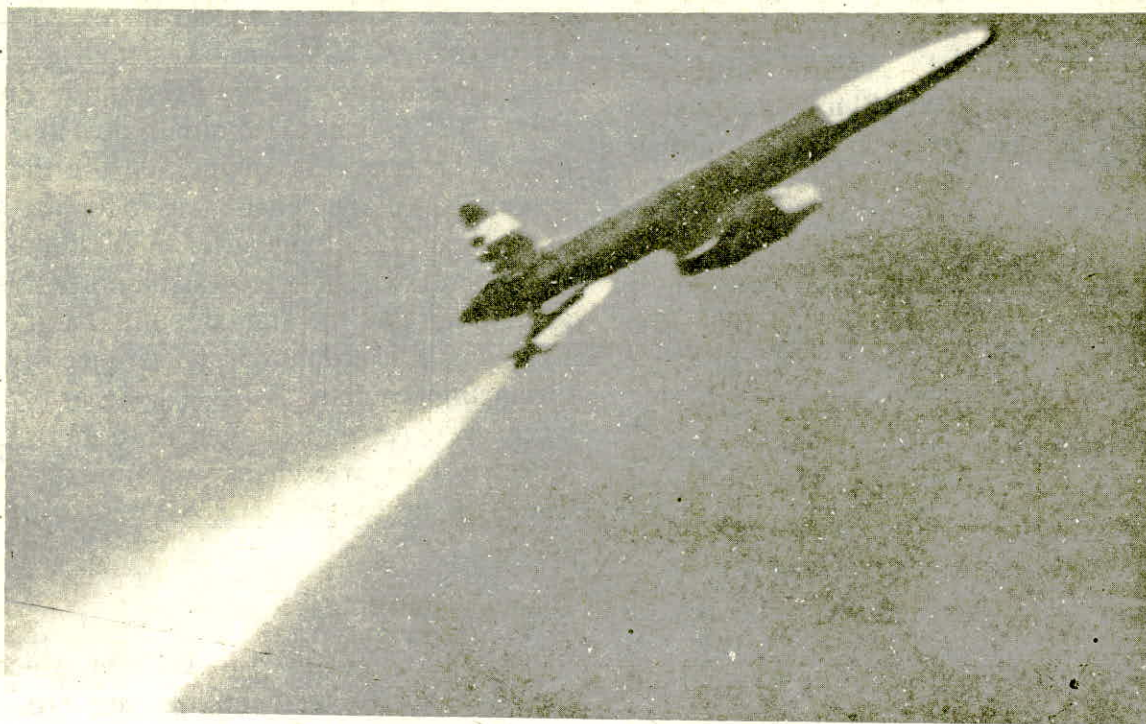
46.01 Introduction

The three Armed Forces were using imported pilotless target aircraft (PTA) systems to provide realistic airborne targets for training aircrews and groundcrews in air-to-air and surface-to-air weapon practice and live firing exercises. In early 1976, the need

for an indigenously designed, developed and manufactured PTA was recognised. Accordingly, a project was sanctioned in September 1980.

46.02 Scope of Audit

The project was reviewed in Audit. Apart from an analysis of project economics, Audit also examined the realisation of physical targets and the implications of delays on the Armed Forces.



Pilotless Target Aircraft

46.03 Organisational set up

The development of the PTA was assigned to the Aeronautical Development Establishment (ADE) in September 1980. The development of an aeroengine required to power the PTA was entrusted to Hindustan Aeronautics Limited (HAL). Produc-

tion of the PTA and its engine was contemplated by HAL. Development efforts for the PTA and its engine were planned to be completed within a period of five years.

46.04 Highlights

- The project estimated to cost Rs.21.5 crores was sanctioned in September 1980

without a comprehensive technical and financial appreciation four years after its conception.

- Weaknesses were noticed in the planning, co-ordination, monitoring and implementation of various project activities. This led to development being postponed to 1990 against 1985 as planned.
- Delay in the development of the PTA led the Services to importing the equipment at a cost of Rs.21.28 crores in foreign exchange. Pending productionisation of the PTA in 1993, the Services will have to continue importing their requirements. This will also mean foregoing anticipated foreign exchange savings.
- Project costs were revised to Rs.24.95 crores and, with further extension to the scope, the project was estimated to cost Rs.81.02 crores. It will increase further on account of delays in user evaluation trials and completion of development.
- Training efforts of the Services were affected adversely and they were handicapped in the evaluation of weapon systems.
- The review indicates the need to monitor the project closely and to control delays and costs with a view to providing the Services with a much needed training equipment.

46.05 Planning

The PTA was required to train air and ground crews in the handling and operation of their weapon systems effectively by achieving a high level of proficiency. Besides, the PTA can also be used in the evaluation of new weapon systems. Its non-availability was a serious lacuna in the past for such evaluation. In May 1976, the need to have the PTA developed indigenously was recognised. A draft Qualitative Requirement (QR), common to the three Services, was evolved by a working group in 1977. Based

on the feasibility study carried out by the ADE, the project for the design and development of an inter-Services PTA by the ADE, satisfying the QR, was sanctioned in September 1980 at a cost of Rs.17.00 crores including a foreign exchange (FE) element of Rs.8.00 crores. The development activity was planned for completion within five years; subsequently, this was extended upto September 1988. The project cost was also revised to Rs.19.55 crores (FE Rs.8.97 crores) in December 1987. The development of an engine by HAL to power the PTA at an estimated cost of Rs.4.5 crores (FE Rs.1 crore) was also sanctioned in September 1980. The time for design, development and type certification of the engine was five years and was later extended to July 1986. The cost of the project was also increased to Rs.5.40 crores. HAL was designated as the production agency for the PTA and its engine. The PTA was to be initially developed around an imported engine and the indigenously developed engine was to replace it at an appropriate stage after successful development. The project was based on the assumption that the annual requirement of PTAs would be around 85, and its unit cost of production would be Rs.12.00 lakhs at 1978 price level. An annual saving of Rs.11 to 12 crores in foreign exchange was envisaged. The PTA was to be in service for at least 10 years.

46.06 Monitoring

The QR evolved in 1977, on which the project was sanctioned, was very broad in outline and required clearer definition. Accordingly, a detailed and revised QR was finalised in July 1982. The formation of a Steering Committee to review and monitor the progress of the PTA and engine projects was approved in July 1981. A Scientific Review Group (SRG) to review the scientific and technological aspects of the design, fabrication and testing of the PTA was also approved in January 1985. The Steering Committee and the SRG were to meet three

and four times a year respectively. Inadequate monitoring is evident from the fact that the Steering Committee met only annually during July 1981 to July 1987 except in 1982 when it met twice. Similarly, the SRG held only six meetings during January 1985 to September 1987.

46.07 Development and trials

The ADE was to manufacture 20 PTA prototypes to carry out flight tests to prove the design and also user evaluation trials in order to facilitate an early decision by the Services on the production order. The launching of a prototype and the flight development programme was planned for completion by September 1985. According to the Ministry, 11 prototypes were produced till June 1988 and nine prototypes were launched upto September 1988. The flight trials carried out in August/September 1988 had been successful and met many targets laid down for tests. In each of the flight trials, certain specific parameters were proved. However, the planned flight testing programme was delayed due to delays in the fabrication of prototypes, changes introduced in designs and delays in engine investigation besides shortcomings in design and fabrication of electrical and electronic systems. Presently, the development activity is proposed to be completed by December 1990.

Twenty aeroengines were received during May 1982 to December 1983 from a foreign firm against a contract concluded in November 1980 at a cost of Rs.113.13 lakhs. Meanwhile, as against six prototype engines to be developed, HAL had produced four and spares equivalent to two engines upto February 1987. Five more were proposed to be built for tests in the PTAs. It was stated by the Ministry in October 1988 that the ground tests on HAL engines had revealed certain technical problems. Integration of the engine with the PTA was expected during July-September 1989 followed by type testing during September-October 1989.

Hence, there has been a three year delay in the development of an indigenous engine.

The need for procurement of a Target Tracking Control Station (TTCS) and an Optical Tracking Station (OTS) at a cost of Rs.2.00 crores was accepted alongwith the PTA project. The amount, however, was not included in the sanction issued in September 1980. A contract was, subsequently, concluded in May 1982 with a foreign firm for the purchase of TTCS at a cost of Rs.144.15 lakhs. The equipment was received in June 1984 and commissioned in August 1984. The purchase of an OTS was arranged under a contract concluded in July 1982 with another foreign firm at a cost of Rs.109.28 lakhs. The delivery of the equipment was due by September 1983. According to the Ministry, the system had been shipped in August 1988 and would be used during the user evaluation phase. It added that non-availability of the system did not hamper the PTA flight development programme as certain other systems available were used.

46.08 Revision of costs

The Services were not prepared to place a large production order till the system was fully evaluated. At the same time, the development efforts were likely to become infructuous in case the production facilities were not established in parallel with the completion of the development activity. In September 1986, in anticipation of full evaluation of the PTA and to eliminate the time lag between completion of the development activity and establishment of the production line, it was decided by the Steering Committee to enlarge the scope of the project to include technology transfer to the production agency and placement of a pre-production order for 50 PTAs on HAL by the ADE treating it as a part of the development project itself. The integration of the indigenously developed engine with the PTA at a cost of Rs.2.15 lakhs was also endorsed by the Steering Committee in June 1987. Ac-

cordingly, a proposal mooted by the ADE in February 1987 and modified in August 1987 for extension of the scope of the development project, envisaged an additional financial liability to the extent of Rs.59.52 crores (FE Rs.12.16 crores) bringing the total cost of the project to Rs.81.02 crores (FE Rs.21.16 crores). The revised costs included Rs.22.93 crores on account of capital and deferred revenue expenditure for producing 100 PTAs annually. It was not clear, however, as to why this expenditure had been committed when user trials had not been completed and the Services had not placed a production order.

Clearly, the project had been sanctioned in 1980 without an adequate appreciation of the financial and technical implications involved. The Ministry stated in October 1988 that ADE had developed the air launched target by the seventies and had the details of development work required for the PTA. Further, enough technical competence was available in the country to take up the project. Financial provision had been made based on detailed estimates and past experience. However, if true, there ought to have been no occasion for project costs to have been revised drastically.

46.09 Present status

Based on projections made in August 1987, the delivery of 50 pre-production PTAs is anticipated by January 1991 and the regular production of 100 PTAs per annum is likely to be achieved by January 1993 in case the order for 50 PTAs was placed by January 1988. The Ministry stated in October 1988 that the order for 50 PTAs was a pre-production trial order to set up the facilities and to evaluate the technology transfer process. It added that since the order has not yet been placed on HAL, the above time-frames would have to be reviewed. The revised proposal was under consideration by the Government and the order would be placed on HAL after the development of the PTA. Further, the unit cost of production of the PTA was esti-

mated at Rs.34.18 lakhs including a foreign exchange element of Rs.9.75 lakhs (at 1986 price level). The total expenditure incurred on the PTA project upto June 1988 was Rs.17.38 crores and against the engine project Rs.6.05 crores. HAL had used its internal funds to the tune of Rs.65.33 lakhs pending sanction of the additional funds for the project by the Government.

46.10 Import of PTAs

It was noticed that the Services imported 79 PTAs between May 1977 and April 1987 at a cost of Rs.26.13 crores. These quantities were procured piecemeal from the same source and were inadequate to meet their training requirements. A co-ordinated approach to procuring the PTAs for the Services could have ensured better value for money and avoided some of the delays that occurred.

46.11 Impact of delays

The non-availability of PTAs in sufficient quantities due to inordinate delays in its indigenous development had affected the training efforts of the Services seriously. This position would hold good at least upto 1993 when PTAs from the indigenous production line are expected to be available. According to the Ministry, a superior quality of training would have been possible with the PTA. In its absence, training was continued with the conventional methods. Further, delays in the availability of the PTA cannot be ruled out as no production order has been placed on HAL so far. The Services are still handicapped in the evaluation of weapon systems.

47. Development of an airborne communication equipment

In pursuance of a Government decision, taken in 1964, to improve upon the existing airborne communication system of Indian Air Force (IAF) aircraft, Air Headquarters (HQ) finalised the operational requirements (OR) for an airborne communication equipment (equipment) in May 1972.

The OR specified that efforts be made to derive the maximum benefit by the use of latest techniques in the field to avoid the equipment becoming out dated soon after production. The date set for making the prototype available was March 1976, while production at the rate of 400 sets per year was to commence from April 1978.

In June 1975, a Public Sector Undertaking (PSU) stated that the advanced technology of component 'B' which would be used in the equipment was being set up by them as a research activity and that the production facility would be set up later. A technical group constituted in February 1975 stated in its report of August 1975 that component 'A' was a technology of the 1960s, which was being replaced by component 'B', an advanced technology in the field. The technical group, therefore, recommended that the equipment be developed using component 'B' in order to make it meet IAF specifications. It also recommended that the design, development and subsequent production of the equipment be assigned to the PSU, which would undertake the development using component 'B', the development of which would be assigned to a research institute (institute) which had demonstrated competence in the field and was prepared to do with the minimum inputs and in a short time of one year.

In the meantime, Air HQ projected its requirement of 1800 sets of the equipment and planned a complete change over programme by March 1984 against 1980 as originally envisaged. For this, the IAF needed 375 sets of the equipment per year commencing from the end of 1978-79. It was stated categorically that even a marginal shortfall in the delivery schedule which would require an extension in the target date was not acceptable to the IAF. In case the PSU was unable to meet the delivery schedule, additional sets to the extent necessary would have to be imported.

With this background, Government sanctioned in December 1975, after over three years of the finalisation of the OR, the design and development, including fabrication, of 10 prototypes of the equipment by the PSU, as their prime responsibility, in collaboration with the institute at a cost of Rs.76.50 lakhs including free foreign exchange (FFE) worth Rs.28.50 lakhs, of which Rs.18.50 lakhs was allocated to the institute with the proviso that Rs.13 lakhs only would be spent if the feasibility of developing component 'B' was established. The project was to be completed by December 1979. A steering committee was set up in December 1975 to guide and monitor the performance and progress of the project.

While reviewing the progress of the project, the PSU claimed in the first meeting of the steering committee held in June 1976 that although they had set up the facility to productionise component 'B', they were simultaneously progressing the development of the equipment without using component 'B' as an insurance against the failures of the institute in the area. In the fourth steering committee meeting held in August 1977, the institute indicated that three sets of component 'B' developed and delivered to the PSU had passed the environmental and performance tests. The steering committee, therefore, decided that import of selective technology for development of component 'B' was not required. In the fifth meeting held in November 1977, the PSU accepted component 'B' for use in the equipment being developed by them. The PSU also stated that system integration using component 'B' had been achieved successfully. Subsequently, five additional sets of component 'B' were delivered to the PSU for incorporation in the prototypes of the equipment. However, during trials and testing, component 'B' registered certain failures. The institute was, therefore, required to re-design it.

In order to meet the target date and considering the idle capacity at the PSU, the

steering committee decided in August 1978 that the PSU would produce the equipment with component 'A' as an interim solution. However, the institute was advised to complete the development of component 'B'. The institute attempted to redesign component 'B' without success. In the mean time, the PSU stated that they would be able to supply the equipment using component 'B' being developed by them. By that time (October 1979) the cost of the development increased from Rs.76.75 lakhs to Rs.99 lakhs. The amount allocated to the institute also increased from Rs.18.50 lakhs to Rs.22 lakhs. Clearly, the duplication of effort in developing component 'B' led to the incurring of expenditure worth Rs.18.05 lakhs which was unnecessary and infructuous.

Consequent to the decision taken in August 1978, Government sanctioned, in June 1982, the procurement of 520 sets of the equipment and 328 modification kits from the PSU at an estimated cost of Rs.20.43 crores. An order on the PSU was placed in August 1982. The delivery of the equipment was to commence from 1982-83 and was to be completed by 1984-85. As the PSU had indicated that they would be able to supply the equipment using component 'B' being developed by them, the steering committee decided in November 1984 that the institute need not continue the development of component 'B'. By that time an amount of Rs.18.05 lakhs had been released to the institute.

The integration of component 'B' developed by the PSU in the equipment was considered by the steering committee and it was decided in August 1987 that it would not be possible to use component 'B' developed by the PSU with the present generation of the equipment and the objective of their proposed use in the equipment was given up. The equipment would thus, be productionised using component 'A' which was based on an outdated technology of the 1960s.

There had been slippages in the delivery of the equipment. Deliveries commenced only in 1984-85 and till July 1988 the PSU could deliver only 278 sets of the equipment and 71 mod kits to the IAF. Of these, only 71 sets have been fitted in various aircraft till July 1988. The other aircraft to be fitted up in the first phase were likely to be re-equipped by 1990. The requirement of the rest of the fleet was yet to be finalised (October 1988). The amount released to the PSU towards development of the equipment was Rs.77 lakhs and Rs.11.31 crores was released to the PSU against the order of August 1982.

The case reveals:

- duplication of research and development effort leading to infructuous expenditure of Rs.18.05 lakhs; and
- the IAF was forced to accept communication equipment based on an obsolete technology outside the time frame specified by it and with an adverse impact on its airborne communication capabilities.

The Ministry of Defence (Ministry) stated in October 1988 that the equipment is being productionised using component 'A' based on a technology of a relatively older generation. According to the Ministry, the delay in the project was mainly due to the non-availability and highly delayed supplies of components required both for components 'A' and 'B'. It added that there had been delay in the supply of the equipment to the IAF.

48. Development of a missile target

In February 1974, the Ministry of Defence (Ministry) sanctioned a project for the development of a missile target (target) at a cost of Rs.3.12 crores with a foreign exchange (FE) component of Rs.1.84 crores, by the Aeronautical Development Establishment (ADE). This target was to replace targets then in use by the Air Force which had deficiencies and could provide only

limited firing practice. The missile target project was to meet user needs as spelt out in the Air Staff Requirements (ASR). The ASR of 1972 was revised by Air Headquarters (HQ) in 1976 to cover the target being developed. The Probable Date of Completion (PDC) of the project was indicated as March 1981 by the ADE after successful completion of development trials by the users which was envisaged to be within 245 weeks from the date of sanction of the project. The target, when successfully developed, was to be produced by a public sector undertaking (PSU).

Most of the development was completed by 1979-80. Even as the development and user trials were under way, another project for the development of a more advanced target designated the Pilotless Target Aircraft (PTA) by the ADE at an estimated cost of Rs.21.50 crores was sanctioned by the Ministry in September 1980. At the time of sanction of the PTA project, an expenditure of Rs.3.20 crores had already been incurred on the development of the missile target.

During technical evaluation trials in 1979 the necessity for further development was felt. Eventually, the target was made available for user trials in January 1982. The trials were completed in April 1984. Based on successful user trials, the project, initiated in 1974, was completed after 12 years in December 1986 after incurring an expenditure of Rs.4.71 crores (FE Rs.2.33 crores). The closure report of the ADE submitted to the Research and Development HQ in August 1987 indicated that the users had certified that the system was operationally viable and that the Air Force had accepted the target.

Notwithstanding the target's operational viability (as proved by successful trials and as also claimed by ADE), Air HQ had advised the PSU in April 1986 that in view of the steep rise in the cost of the target and its limited utility for training as compared to

the indigenous PTA which was expected to be made available by 1989-90, the target was prohibitive in cost (Rs.14 lakhs) and not operationally viable. Therefore, Air HQ decided not to place production orders. However, in order to meet its training requirement, a quantity of 190 targets were contracted during August 1985 to March 1987 at a cost of Rs.20,679 each (total cost in FE: Rs.39.29 lakhs).

There was evidence of lack of proper monitoring of the project as the Technical Co-ordination Authority (TCA) which had monitored the project had only 21 sittings from January 1976 to June 1984. The TCA did not meet after June 1984 though the development project was closed only in December 1986.

The Ministry stated in September 1988 that the target which met the ASR in April 1984 was, however, not accepted by the users as it was not operationally viable due to a change in the operational scenario. According to the Ministry, by the time the trials established that the target met the ASR, its operational viability became doubtful.

Thus, the development project initiated in February 1974 for completion by March 1981 was actually completed in December 1986 at a cost of Rs.4.71 crores. During the long development period of 12 years the estimated unit cost of production had increased from Rs.2.5 lakhs to Rs.14 lakhs resulting in the production of the target becoming uneconomical. Further, even though another project for a more advanced target (PTA) was sanctioned in 1980, the development project of 1974 was allowed to continue. Since the target was not productionised, it resulted in the development cost of Rs.4.71 crores becoming infructuous. More seriously, weapon training suffered due to use of substitute targets which were of limited value.

NAVY

49. Working of Naval Research and Development laboratories

49.01 Introduction

The Department of Defence Research and Development (DDR D) is the focal point for all scientific and technological aspects of national security. The mandate of the department is accomplished through a network of laboratories and establishments administered by the Defence Research and Development Organisation (DRDO). The Naval Physical and Oceanographic Laboratory (NPOL), Cochin, the Naval Scientific and Technological Laboratory (NSTL), Visakhapatnam and the Naval Chemical and Metallurgical Laboratory (NCML), Bombay are laboratories which cater specifically to the requirements of the Navy.

49.02 Scope of Audit

The scope of the review extended to budgeting, financial and accounting matters, the status of various projects undertaken by the laboratories and the adequacy of monitoring arrangements. Manpower planning, availability and utilisation as well as inventory control was also examined.

49.03 Organisational set up

The NPOL, established in 1952, was absorbed in the DRDO in 1958. Since then, the laboratory, besides providing fleet support to the Navy, has been primarily associated with research and development work related to underwater detection systems and research studies.

The NSTL was set up in 1969 to undertake research and development (R&D) work connected with underwater weapons and marine engineering. The laboratory's present charter encompasses R&D work on underwater weapons, range instrumentation, marine engineering, studies on shock vibration and ship modelling. The NCML was established in the early 1950s as an in-

house testing laboratory of the Navy. Presently, the laboratory undertakes R&D work on marine corrosion, anti-corrosive and anti-fouling paints, marine bio-fouling, welding technology, fracture mechanism and environmental pollution in Naval bases.

49.04 Highlights

- **The review reveals serious weakness in the working of the Naval Research and Development Laboratories. There was evidence of poor budgeting and lack of effective financial control. A costing system was not implemented. In its absence, there was no mechanism to realistically assess costs of R&D activities and to avoid waste and infructuous effort.**
- **Due to ineffective inventory control, stores costing over Rs.268 lakhs were not returned to stores contrary to orders and were lying without use after the completion of projects. Besides, stores worth over Rs.23 lakhs were purchased just before or after the closure of projects.**
- **Machinery costing over Rs.741 lakhs was purchased but in the absence of proper records it was not possible to verify their utilisation and maintenance.**
- **Performance budgeting envisaging a system of planning, forecasting, programming and performance monitoring of projects was not implemented by the laboratories. This contributed to redundancies in procurement of machinery and creation of assets at huge costs.**
- **Deficiencies in manpower had also affected the progress of projects to a considerable extent.**
- **No records were available indicating the result of stock taking conducted by the laboratories and the items developed and issued by them.**
- **Various major facilities created at considerable costs could not be fully utilised**

due to inadequate project planning and execution.

- **Poor control on planning, execution, costs of projects, resulted in heavy time and cost over-runs. Dates of completion were not adhered to in 60 per cent of the projects closed during the period 1978-87. The delays ranged upto 13 years in 54 per cent of the cases. The increase in costs varied between 3.8 and 231.7 per cent.**
- **The Ministry of Defence (Ministry) agreed (October 1988) with most Audit findings and indicated that remedial action was being initiated.**

49.05 Review arrangements

Naval research and development projects emerge from expressed, anticipated and futuristic needs. The feasibility of their execution is required to be ensured from the scientific, technical and economic angles. The projects are categorised as 'Staff Projects' and 'R and D Projects'. Staff projects are user oriented whereas R and D projects are for general competence building in a given field. Staff projects form the basis for overall planning for resources and technical activities of the establishment.

R and D projects are required to be constantly reviewed to maintain a positive control over time, cost and performance by applying modern techniques. Apart from continuous performance monitoring, evaluation and review of the projects in progress and implementation of decisions arising from performance appraisal such as foreclosing the project, corrective measures directed towards improving performance is also contemplated through performance budgeting by constituting a planning-programming cell and a project costing and accounting cell. A time frame for the completion of projects is required to be fixed on a realistic basis after taking all relevant factors into account and is not to be changed except in exceptional

circumstances with the specific approval of the Raksha Utpadan Mantri.

49.06 Project details

An analysis of the projects undertaken by the laboratories during 1978-87 (upto June 1987) indicated that at NPOL, out of 39 projects closed during 1978 to 1987, the probable date of completion (PDC) in respect of 28 closed projects (12 staff and 16 R&D) were not adhered to. The delays had ranged between 2 and 13 years in respect of 13 projects and less than two years for 15 projects. At NSTL, out of 44 closed projects the PDC in respect of 38 (26 R&D and 12 staff) projects was not adhered to. The extent of delay was from one to eight years in respect of 31 projects. For seven projects, the delay was less than one year. Out of 37 closed projects at NCML, the PDC in respect of 14 projects could not be adhered to. The delay was from one to three years in eight cases and less than one year in respect of six projects. At NPOL, out of 25 projects in hand as in July 1987, the original PDC in respect of five projects has expired, and the delays have ranged from one to eight years. At NSTL, out of 46 projects in hand as in July 1987, the original PDC in respect of 28 projects had expired. The delays ranged between two and eight years. Similarly, at NCML, of the 14 projects in hand as in July 1987, the original PDC in respect of two projects has already expired and the delay in these cases varies from one to three years. Closure reports were prepared only in respect of 18, 8 and 3 projects at NPOL, NSTL and NCML respectively. It was stated by the Ministry in October 1988 that closure reports for 33 and 31 projects were prepared in September 1988 at NPOL and NSTL respectively and action was in hand to prepare closure reports for the remaining projects. Additionally, there were significant cost overruns in respect of 13 projects at NSTL and eight projects each at NPOL and NCML primarily due to an increase in the work content of the projects. The increase in cost

worked out to between 3.8 and 231.7 per cent. Obviously, there was little control on time and cost factors.

49.07 Manpower

There was a marked deficiency in manpower, both technical and non-technical at the NPOL. The extent of deficiency ranged from 22 to 30 per cent during the period 1983 to 1987. This deficiency had affected the progress of projects to the extent that one project was dropped, development work was subcontracted to outside agencies in other cases and certain projects were given lower priorities. Shifting of manpower from project to project had also been resorted to, reportedly to minimise delays in completion. At NSTL, the overall average deficiency in the technical and non-technical cadres was to the extent of 30 and 23 per cent respectively. Two major projects were short-closed on this account. In the NCML, the overall average shortage during

1982-87 was 20.48 per cent. In the case of the technical cadre, it was 18.1 per cent. This led to makeshift arrangements for manpower. The reasons for continuing deficiencies and their impact on project activities had not been evaluated so far. According to the Ministry, the shortage in manpower was due to ban on recruitment, non-availability of proper personnel and inordinate delay in positioning of manpower on account of procedural formalities. It added that new manpower policies were expected to overcome the deficiencies in future. 49.08 Budgetary control

An analysis of the budgets, amounts allotted, appropriations made and actual expenditure of the three laboratories during the period 1982-83 to 1986-87 revealed poor forecasting of resources required and unsatisfactory budgetary control. This is illustrated from the data given below:

Year	Forecast Budget Estimates	Allotment	Demand as per modified appropriation	Actual Expenditure
(Rupees in lakhs)				
N P O L				
1982-83	534.96	365.48	278.63	257.74
1983-84	564.68	412.77	357.03	267.05
1984-85	807.73	470.90	536.59	354.47
1985-86	1059.94	689.14	514.58	481.58
1986-87	1641.55	916.02	766.90	753.95
N S T L				
1982-83	909.15	371.94	437.29	348.18
1983-84	1249.52	477.50	504.80	319.03
1984-85	1394.69	358.09	750.89	442.35
1985-86	2006.82	680.75	1163.45	1034.58
1986-87	6354.27	1206.25	1148.50	1119.86
N C M L				
1982-83	183.14	125.50	142.40	91.71
1983-84	226.29	153.60	153.87	121.74
1984-85	Not Available	165.99	193.72	105.68
1985-86	628.46	209.57	199.07	115.99
1986-87	225.60	180.91	147.61	138.22

These inadequacies can be ascribed essentially to the lack of sound systems of financial management. The Ministry stated that the budgetary system was being further strengthened.

49.09 Costing and performance budgeting

A costing system introduced in 1969 and withdrawn in 1975 was not implemented by any of the laboratories. Consequently, there were no means by which cost consciousness and cost control could be ensured. Likewise, a system of performance budgeting, introduced in April 1974, was not implemented in any of the laboratories. It envisaged project analysis, continuous performance monitoring evaluation and review by separate cells to be constituted by each. However, cost-benefit analysis was not done and performance reports incorporating techno-economic analysis were not prepared. There were no valid reasons for the absence of such standard tools of financial management. The Ministry stated that due to practical difficulties, the costing procedure was not implemented. It added that no suitable and adequate staff was available to do costing work who could understand the procedures properly and implement them. These aspects were being reviewed at R and D Headquarters. As regards performance budgeting, it was stated that efforts were made at NPOL to implement the system. It added that the introduction of the procedure being a herculean task could not be fully implemented due to shortage of qualified manpower. However, the position was being reviewed at R and D Headquarters.

49.10 Inventory control

The laboratories had large inventory holdings of high value. At NPOL, the value of stores and materials purchased was Rs.582.69 lakhs in 1986-87. At NSTL, the value of purchases of stores and materials was Rs.916.00 lakhs in 1986-87. NCML had purchased inventory costing Rs.323.04 lakhs during 1982-83 to 1986-87. In spite of sizeable

inventories, no separate Stock Keeping Manual for the R and D Organisations had been prescribed upto July 1988 though the DRDO was formed as early as 1958. At the same time, no uniform system of store accounting in the laboratories is being followed. The Ministry stated that the matter was under consideration to issue a common store accounting procedure for the entire DRDO.

49.11 Project fund accounting

In February 1977, a uniform procedure for project fund accounting in R and D establishments was introduced. The procedure envisaged that all non-consumable stores drawn on nominal vouchers indicating the project numbers and the value of stores would be recorded in the project expenditure card. After the closure of each project, non-consumable stores not incorporated in the prototype are required to be returned to the main stores and would become part of the general inventory. The stores incorporated in the project would be charged off through demand-cum-issue vouchers and the cost thereof adjusted in the expenditure card. It was, however, noticed that at none of the laboratories where the non-consumable stores which remained unutilised after the completion or closure of projects, returned to stores as required. The cost of such stores at NPOL in respect of 23 projects closed between 1983 and 1985 worked out to Rs.2.42 crores. At NSTL, the cost of stores not returned pertaining to 19 projects closed between 1978-1987 amounted to Rs.187.45 lakhs. For another 21 projects closed during the same period, the project expenditure cards were not shown to Audit. At NCML, the value of stores for 23 projects closed during 1978-1987 was Rs.77.28 lakhs. The Ministry stated that, till October 1988, non-consumable stores at NPOL in respect of all the 23 projects had been returned to stores and merged as part of the general inventory. At NSTL, non-consumable stores are stated to have been issued in respect of 10 projects. For the

remaining 11 projects, the cost of stores was Rs.3.30 lakhs. At NCML, the system of returning stores was not in vogue as the capital equipment procured were of general types and used in day to day analysis also. On the whole, it was stated that efforts were being made to merge the non-consumable stores from closed projects to the stores department.

No adjustment of costs in respect of closed projects in expenditure cards had been made in any of the laboratories. No subsidiary registers for consumable stores drawn in bulk were maintained at any of the laboratories. Essentially, therefore, there was no control over the consumption of non-consumable stores and adjustment of their value. Further, due to lack of effective control, stores costing over Rs.268 lakhs were lying without use with various project groups for years together. Laboratories were being advised to follow the procedures in future.

It was found at all three laboratories that the machine and history cards in respect of machinery held on their charge were not maintained. The cost of machinery available at NSTL was Rs.512 lakhs. At NCML, the cost of machinery procured during 1982 to 1987 worked out to Rs.180 lakhs approximately. In NPOL, the cost of machinery held on their charge was Rs.48.97 lakhs. In the absence of history and machine cards, it was not possible for Audit to verify the utilisation and maintenance of the machines. The Ministry stated that machinery cards for equipment/machine tools installed in the workshops were being maintained. It added that the existing instructions were outdated and needed updating in the present day context. A revised procedure was likely to be issued shortly. Thereafter, the utility or otherwise of any item of equipment could be assessed realistically.

49.12 Stock taking

Annual stock verification of all stores is required to be carried out by a board of

officers and a permanent record thereof is to be kept. However, items issued to projects were not being physically checked by the respective boards of officers. At NCML equipment costing over Rs.8.5 lakhs procured against a project, held at a station and subsequently handed over to the Central Dockyard Laboratory in January 1986 were not verified by the Board. At NSTL, a torpedo was lost during sea trials in January 1980 but charged off from the ledger only in March 1981. However, the Board which conducted the annual stock taking did not reflect the discrepancy during 1979-80 even though the torpedo was not physically available. Further, no records of the results of annual stock taking indicating ledger and physical balances were maintained at the laboratories. It was stated by the Ministry that records of stock taking would be maintained and preserved for audit scrutiny in future.

49.13 Discrepancy and railway claim register

The laboratories were not maintaining a discrepancy register or a shipping claim register. At NCML and NPOL, the railway claim registers were also not being maintained. In the absence of these documents, it was not possible to assess the extent of discrepancies, claims raised thereagainst and recovered. The Ministry stated that the laboratories had since started maintaining the registers.

49.14 Surplus/unserviceable stores

According to orders, stores which are surplus or unserviceable or no longer required are to be reviewed periodically for disposal. The reviews were not carried out regularly at any of the laboratories. At NSTL, only one review was conducted and a list of 270 items circulated to various R and D laboratories in August 1987. The disposal of these items was still in hand in October 1988. In NCML, no such review has been conducted. The Ministry stated that 999

unserviceable items were condemned during 1981-82, 1984-85 and 1986-87. However, their money value was not given. The items were awaiting disposal as in October 1988. At NPOL, reviews conducted in September 1986 and July 1987 revealed stores no longer required and surplus to the extent of Rs.4.16 lakhs and Rs.1.27 lakhs respectively. Their disposal was also awaited. It was also noticed that no records were maintained by NPOL and NSTL for the accounting and issue of prototypes, laboratory models and other models developed by them over the years as required. According to the Ministry, the procedure would be followed in future.

49.15 Procurement of stores after closure of projects

At NPOL, no details of expensive equipment available with other institutions are maintained. It was not possible, therefore, to confirm that duplication in procurement had been avoided. The non-availability of such information, centrally, led to equipment, in some instances, being received after the closure of the project. In respect of nine projects, equipment costing Rs.13.20 lakhs were received either after the closure of the projects or at the very end of the projects. NPOL stated that many of this equipment was of general laboratory type and, on completion of the project, was used as part of general laboratory facilities when required. The progress of the project in general was not affected due to late arrival, as similar equipment was available within the laboratory or outside NPOL. However, the chances of duplication in procurement in such circumstances cannot be ruled out altogether apart from the fact that if equipment specifically procured for a project arrived at or after its closure, it would be of little direct value and its procurement was avoidable. To illustrate, items costing Rs.4.82 lakhs were imported in April 1983 for use in the second Antarctica expedition to be undertaken between December 1982 and March

1983. Similarly, equipment costing Rs.6.24 lakhs procured during September 1983 to March 1984 for the third Antarctica expedition was not used as NPOL did not participate in the expedition. The Ministry stated that equipment for third Antarctica expedition were of general oceanographic data acquisition type and were being used as such. In NSTL, stores, equipment and tools costing Rs.10.00 lakhs in respect of 10 projects were received after the closure of the projects. In respect of eight projects, the bulk of the expenditure booked against the projects was incurred after their closure. Obviously, the procurement of these stores was avoidable. The Ministry stated that efforts had been made to avoid procurement of equipment at the fag end of the projects. It added that their proper utilisation in similar types of projects in future would be ensured.

49.16 Non-recovery of development expenditure

After the development of models by R and D laboratories and their successful user trials, bulk production orders are placed on outside production agencies. In the process, the technology developed by the laboratories is transferred to them. It was seen that there was no well defined system to recover costs of development on transfer of technology to the various production agencies. The expenditure incurred towards development by NPOL and NSTL amounted to Rs.1,532.37 lakhs and Rs.151.41 lakhs respectively against production orders placed on various agencies. None of this expenditure was recovered by the laboratories. The existing orders were being reviewed by R and D Headquarters.

49.17 Major projects

Some of the major projects undertaken by the laboratories were examined in Audit with a view to assessing whether end-user objectives had been met and an adequate return obtained on investments made. A

few cases are indicated in the succeeding paragraphs.

NPOL

A project to develop a Towed Torpedo decoy system was sanctioned in January 1978 at an estimated cost of Rs.47.17 lakhs revised to Rs.161.71 lakhs in February 1987. Three units were expected to be produced by June 1984. However, only one unit had been produced by July 1985. Apart from costing Rs.133.35 lakhs and rendering material worth Rs.18.76 lakhs surplus, the project had provided the Navy with only one unit as of July 1988 for extended sea trials.

In another case, a project to set up underwater acoustic research facilities was sanctioned in September 1978 at a cost of Rs.75.51 lakhs. This was revised to Rs.100 lakhs in November 1984 with a recurring expenditure of Rs.10 lakhs per annum. The acquisition of assets such as residential buildings, machinery and equipment was not carefully planned. Consequently, residential buildings acquired at a cost of Rs.9.74 lakhs were not found suitable, subsequently necessitating the construction of new buildings. A barge acquired and modified at a total cost of Rs.19.16 lakhs between 1979 and 1985 could not be used for calibrating the transducer. A floating platform was, therefore, acquired at a cost of Rs.31.17 lakhs between 1983 and 1987. As against an average workload of 2,450 mandays expected of the facilities, only 179 mandays were availed of between April 1979 and June 1987. The floating platform was not utilised till July 1987 for calibration of low frequency transducers and an asset worth Rs.31.17 lakhs remained idle from the very beginning. In summary, the entire range of facilities set up at a cost of Rs.103 lakhs remained grossly underutilised. While they were used by private agencies during 1985-87 for 144.10 hours, no charges were either levied or recovered for such use. The Ministry stated that inherent limitations like

weather, maintenance time for non-availability of water level for navigation etc. restricted the utilisation of the facility. It added that the facility was not likely to be used for more than 30 to 50 days in a year. Further, the procedure for recovery of charges from other institutions was being evaluated.

A third case relating to the establishment of a transducer assembly facility was also examined. Sanctioned in 1978 at an estimated cost of Rs.94.5 lakhs, an amount of Rs.166.46 lakhs had been spent on it by October 1987. The facility was expected to save foreign exchange worth Rs.1.72 crores upto 1983 by producing 5,706 transducers of 11 systems. However, only 86 transducers of seven systems had been produced upto 1982. Further, 2,545 transducers worth Rs. 8 crores were to be produced during 1983-88. In fact, only 571 transducers worth Rs.67.40 lakhs had been produced upto 1987. Obviously, the facilities were considerably underutilised. A review of the facilities which was to have been undertaken in 1987 was not carried out.

NCML

A project to develop polymers with acoustic properties for use in sonar and underwater application was sanctioned in January 1980 at a cost of Rs.12.05 lakhs. It was closed in July 1986 after incurring an expenditure of Rs.8.43 lakhs without conducting phase II trials. Earlier, the results of phase I trials were inconclusive.

In a second case, a staff project was sanctioned in February 1983 for developing a safe descaling compound to clean boilers of ships. The Navy, however, were reluctant to allow the compound to be tried in the main boilers of their ships (January 1987). Pending trials, the project was closed in December 1986 after incurring an expenditure of Rs.2.45 lakhs.

A third project for the development of futuristic ceramic materials was sanctioned

in June 1981 at a cost of Rs.45.65 lakhs. It was envisaged that the technology for the development of Hydrophones using such materials would be available in the country at the appropriate time for carrying out user trials. Foreign exchange savings to the extent of Rs.70 lakhs upto 1985 were also envisaged. However, till September 1987, when the project was closed after spending Rs.14.90 lakhs, technology for the development of hydrophones using such materials was not available. User trials were also not carried out till April 1988. The item has not been produced so far. The investment has been clearly unproductive. The Ministry stated that the production of such materials was not required at present. It added that the technology developed could be transferred to a production agency at an appropriate point of time.

In yet another case, a project to develop ceramic materials by fine particle technology was sanctioned in January 1977 at a cost of Rs.24 lakhs. While the technology was developed and the facilities set up in January 1981, production of ceramic crystals could not be undertaken till April 1988 reportedly for want of space in the laboratory. It was noticed that savings of Rs.57.50 lakhs in foreign exchange anticipated on the basis of requirements of ceramic crystals for torpedoes and sonars upto 1985 did not materialise. Additionally, imports on this account from 1981 to August 1988 cost Rs.25 lakhs. The investment of Rs.21.67 lakhs on the development of the technology and the setting up of facilities was, therefore, unproductive.

NSTL

A project for development of wire guided torpedoes was sanctioned by Government in April 1982 at a cost of Rs.475.50 lakhs (later revised to Rs.500 lakhs) even though there was no specific Naval requirement. In a meeting of the Naval Research and Development Panel (NRDP) in No-

vember 1979, it was decided to continue work on this project to absorb knowhow even though Naval Headquarters (HQ) had recommended its closure on the ground that there was no requirement for such torpedoes. Rs.277.93 lakhs had been spent on the project till October 1987 and NSTL stated in February 1988 that the Navy was working on the Qualitative Requirement (QRs) which should be ready by 1991. The Ministry stated that the QR for Wire Guided Torpedo had been finalised and a proposal submitted for its development at an outlay of Rs.20 crores approximately. The development effort was likely to fructify by 1991.

In April 1982, Government sanctioned the development of a single tube launcher system (STL) for Seaward Defence Boats (SDB) at a cost of Rs.35.30 lakhs. In August 1982, the Naval Group Advisory Committee (NGAC) suggested a review of the requirement of the STL owing to non-availability of SDBs with suitable sensors. However, as stated by NSTL in January 1988, Naval HQ had confirmed the requirement of STL in June 1983 and work on the project continued. NSTL proposed stage closure of the project in June 1987 on the ground that SDBs with suitable sensors were not available for trials. Till then, expenditure of Rs.29.63 lakhs had been incurred. The item so developed continues to be held by NSTL pending trials.

In a third case, Rs.74.15 lakhs were sanctioned in August 1977 for developing a technique for noise measurement and noise mitigation in ships revised to Rs.89.50 lakhs in August 1987. The completion date of the project was initially set at February 1982 but subsequently revised to February 1987 due to non-materialisation of orders for components, delay in fabrication by the production agency and incorporation of revised requirements of the users. NSTL reported in June 1987 that the project would be closed after handing over the noise measurement units to the Navy. However, these had not been

handed over till March 1988. In the meantime, Rs.57.89 lakhs had been spent on the project without developing any technique of noise mitigation.

In May 1982 and July 1982 Government sanctioned Rs.44.1 lakhs and Rs.44.35 lakhs for two projects viz. 'submarine attack teacher' and 'submarine control room simulator' with date of completion as May 1985 and July 1985 respectively. In September 1983, it was reported that the progress of these projects was not satisfactory due to acute shortage of manpower in the discipline of microprocessor and simulator. The NRDP agreed to the stage closure of these projects effective September 1983. NSTL sought their reopening in April 1985, but in September 1985, the Navy communicated final closure of these projects. The total expenditure incurred till October 1987 on these projects was Rs.5.04 lakhs and Rs.7.83 lakhs respectively of which a sum of Rs.4.68 lakhs and Rs.6.05 lakhs was incurred after September 1983 when the decision to stage close these projects was taken. The expenditure booked after the stage closure of the projects represented the purchase of imported electronic components with long lead time. These purchases were made in anticipation of the projects being revived at a later stage. Stores worth about Rs.11.53 lakhs purchased for the two projects continue to be held by NSTL without use. Further, owing to stage closure, no cost could be recovered from the Navy as originally envisaged.

49.18 Other topics

Based on an NSTL indent of July 1984, the Directorate General of Supplies and Disposals (DGSD) concluded an agreement with the Indian agent of a foreign firm in November 1985 for the supply of an opti-

cal grinding machine at a cost of Rs.14.75 lakhs in foreign exchange. The machine was received by NSTL in July 1986. During inspection, it was noticed that what was supplied was other than what had been ordered. In the meantime, payment to the foreign firm had been made based on shipment certificates. The Indian agent of the supplier intimated in November 1985 that the manufacturer had discontinued the production of the machine ordered and offered an alternative model which, however, was not acceptable to NSTL. Also, the eighteen month warranty had expired in December 1987. Thus, equipment valued at Rs.14.75 lakhs in foreign exchange received in July 1986 could not be installed and used till March 1988. NSTL did not indicate whether the equipment could be put to alternative use.

A requirement of 100 acres of land for NPOL was estimated in early 1981 in order to cater to the provision of new laboratories, trial and test facilities and workshop support infrastructure. Land measuring 35.30 acres was transferred from a State Government free of cost in 1982. During April 1986 to March 1987, 53.553 acres of private land was acquired and advance payments of Rs.158.58 lakhs, being 80 per cent of the cost of land were made. However, due to delays in taking possession of the land, a liability of Rs.22.43 lakhs was incurred towards additional compensation. Similarly, payment of interest on the balance 20 per cent of land payable worked out to Rs.5.94 lakhs till September 1987. The remaining 11.447 acres of land was still to be acquired. According to the Ministry, the State Government could offer possession of the land piece-meal. This delay was considered as unavoidable due to the cumbersome procedures and legal complications involved.

AERONAUTICAL DEVELOPMENT AGENCY

50. Light Combat Aircraft project

50.01 Introduction

The Light Combat Aircraft (LCA) Project was initiated in the early eighties based on the long term requirements of the Indian Air Force (IAF) for a light weight, multi-role, multi-mission tactical fighter for air combat and offensive air support operations. In June 1981, the Government had approved proposals of the Defence Research and Development Organisation (DRDO) relating to the initiation of consultations with foreign firms in order to arrive at suitable collaboration and consultancy arrangements for the project. Subsequently, in August 1983, Government approval was obtained for undertaking the project from 1983 over a period of 8 to 10 years at a cost of about Rs.560 crores. The project is presently under execution.

50.02 Scope of Audit

Audit has reviewed the scope of the project, the adequacy of the organisational arrangements as well as planning and monitoring mechanisms and the status of project implementation. Financial aspects relating to budgetary control and financial management have also been examined. An assessment was made of the feasibility of meeting the requirements of the IAF in time as envisaged.

50.03 Highlights

- **The review shows significant delays in project implementation as a result of which the original objective of meeting the IAF's requirements in time is unlikely to be realised.**
- **Even though more than five years had elapsed since the sanction of the project in August 1983 and significant expenditure (Rs.132.26 crores approximately) had been incurred, the project definition**

phase (PDP) is yet to be completed. The escalated project cost is estimated to be over Rs.750 crores.

- **The power plant project, estimated to cost Rs.405 crores has not yet been sanctioned. Engine development is behind schedule and the targetted availability of the production version by 1997 will lead to a mismatch between the production of the aircraft and the availability of an indigenous engine.**
- **No decision about weapons for the aircraft has been taken so far.**
- **Also, the work packages to be assigned to various work centres are yet to be identified due to non-finalisation of the PDP.**
- **Consequently, the LCA which was anticipated to be inducted by 1990, would now be inducted only by 1996. This would require alternative arrangements to be made to meet the gap between the IAF's requirements arising out of the phasing out of its existing combat aircraft from 1990 onwards.**
- **There have been weaknesses in planning and ineffective monitoring contributing to overall delay.**
- **Financial management has also been inadequate leading to considerable under utilisation of funds.**
- **The absence of a Chief Executive in the project organisation for almost three years has had an adverse impact on the smooth running of project activities.**
- **The review points to the need for an urgent evaluation of the present state of affairs so that the project is not further delayed and the IAF's requirements not compromised.**

50.04 Need for LCA

The IAF's deficiency of 'X' squadrons in 1990-91 was forecast rising to 'Y' squadrons by 1994-95. The position beyond

1995 was expected to become even more critical. This shortfall was proposed to be made up with the LCA provided it was productionised on schedule. This meant inducting it into squadron service by 1990. The IAF had issued an Air Staff Target (AST) in April 1981 for the LCA. The critical requirements indicated in the AST stipulated that the LCA should have moderate fly away and life cycle costs and should maintain specified performance characteristics. Advanced technologies including digital fly-by-wire systems, were to be employed in the design of the aircraft.

A technical team constituted by Government in February 1980 reported in 1981 that the performance level for the LCA as specified in the AST could be achieved with proven and available high technology engines to be procured from abroad which could be replaced at an appropriate stage by an indigenously developed engine by the Gas Turbine Research Establishment (GTRE). It also suggested that the non-recurring development expenditure for the LCA would be approximately Rs.500 crores and that the time for its development and induction into service would be about 9 to 10 years.

50.05 Pre-feasibility studies

Pre-feasibility studies were initiated after Government approval in June 1981. Discussions were also held with possible collaborators for arriving at a final option. In February 1982, it was agreed that there was an urgent need to launch the LCA programme to meet the IAF's requirements. This was considered essential since aircraft from foreign sources would be prohibitively expensive after a decade and the country would have to rely increasingly on indigenous capability. It was also considered that buying aircraft from abroad implied supporting technology development and related production bases in other countries at our expense.

It was recognised in July 1983, that the total development cost of the LCA over a period of 8 to 10 years would be Rs.560 crores approximately and that this would include 6 prototypes at the 1982-83 price level. The project costing Rs.560 crores, however, was sanctioned only in August 1983. The Ministry stated that the tasks envisaged in 1981 were so enormous and complex in nature, that they took nearly two years to complete.

50.06 Feasibility study

A feasibility study was contracted to four foreign firms between September and December 1983 with a view to gathering as much technical, managerial and cost data as possible. Subsequently, after the receipt of the recommendations of the firms, normalisation studies were carried out by the Indian LCA Team to determine the optimal design configuration compatible with performance levels stipulated in the AST. The final feasibility study report was presented in May 1985. Its major conclusions were:

- The LCA concept was feasible.
- Imported engine 'A' was best suited to the LCA from the available options. A version of the Gas Turbine (GTX) family of engines being developed by GTRE could be an attractive power plant for the LCA after successful type certification. First prototype of the LCA will fly in the first quarter of 1990 and induction into operational service would be possible by the middle of 1994.
- The estimated unit fly-away cost assuming 200 production aircraft at the 1984-85 price level would be Rs.10.30 crores.

It was assumed that development and production investment costs at 1985-86 prices would be Rs.750 crores. However, the basis of this assumption was not provided to Audit and, therefore, there were no means by which the accuracy of the estimates could be confirmed. Further, the unit cost of the aircraft

estimated at Rs.10.30 crores (1984-85 price level) did not include the amortized element of development and pre-production investment costs which would indicate a much higher figure. The Ministry stated in October 1988 that in the absence of inputs from the Project Definition Phase (PDP) and configuration studies, the figure of Rs.750 crores was a second estimate having accounted for escalation which had taken place since the first.

50.07 Formation of Aeronautical Development Agency

Considering the diverse nature of technology to be employed in the design and development of the aircraft and the several agencies, both public and private, whose skills and resources needed to be coordinated for achieving the project objectives, it was proposed in July 1983 that a new managerial arrangement should be made which would be dedicated to the management of the programme in its technical, financial and administrative aspects. Accordingly, the Aeronautical Development Agency (ADA) was constituted and registered as a society in June 1984. Among the various objectives of the ADA, the most significant is the one which requires it "to undertake, and, promote, guide, manage, coordinate and execute research in aeronautical science, design and development of various types of aircraft and rotorcraft". A governing body was also constituted with senior officials of the Government as also the Director General, ADA and was required to meet at least 4 times a year. Project Review Boards were set up as well as an LCA programme Management Committee which is responsible to the governing body for the proper progress of design and development of the LCA including the attendant technology development programmes. Rules and regulations were also provided for the management of the society's funds. No reasons were, however, available to indicate why it took almost a year to set up the ADA after issue of Gov-

ernment sanction for the project in August 1983. The Ministry stated that due to the complexities of the task, the matter was under consideration of a committee of secretaries, whose deliberations took some time.

50.08 Completion of Project Definition Phase

The milestones indicated in the final feasibility report indicated various development activities which were required to be completed within 126 months from the date of go ahead (January 1985). None of the first 6 stages of the development phase which were required to be completed within 42 months, including project definition studies, major wind tunnel tests and completion of detailed design etc. have been completed. In fact, the PDP which was required to be completed by July 1986 is still not complete. This phase was considered crucial for purposes of preparing a document which would contain a definition of the airframe and its systems in sufficient architectural detail so that work packages could be suitably assigned to identified agencies in the country and abroad.

The Ministry have confirmed that the completion of the PDP has been delayed on account of technical complexities, difficulties in evaluation of capabilities and proposals of foreign consultants and approvals of such proposals and teething problems in the establishment and operation of new 'inter-agency' working procedures which are required for the LCA.

The Ministry have further stated that the formal ASR was issued only in November 1985 and the ADA was able to commence work on the PDP and other activities only thereafter. The PDP commenced in 1987 and is scheduled to be completed by December 1988.

50.09 Work packages

Eleven work centres, including ADA itself, six divisions of Hindustan Aeronautics

Limited (HAL) and others were identified as work centres but work packages to only five work centers were assigned. ADA has signed Memoranda of Understanding (MOU) with each work centre which has its own accounting formation and renders accounts to ADA without any supporting vouchers. The value of work packages assigned upto October 1987 was Rs.18.6 crores. However, ADA has not signed MOUs with any of the HAL divisions. The Ministry stated that major definitions of work packages and the work centres to whom these are to be assigned would come about only at the conclusion of the PDP. Obviously, even the work packages to be assigned to various work centres remain to be identified as of November 1988.

50.10 Consultancy arrangements

Two consultant firms were located for consultancy on the project definition phase. A contract with firm 'A' was signed in October 1987 for support on base line configuration and requirements during the project definition phase. The contract was worth 55.5 million French francs, (Rs.9.74 crores) including an advance payment of 11.1 million French francs (Rs.1.95 crores). ADA were unable to indicate the basis on which it accepted the prices quoted by firm 'A' as reasonable in terms of the services offered. Further, there was no indication as to why an advance payment of 11.1 million French francs had been agreed to when the firm was not required to make any material supply to ADA. The firm has been paid 22.2 million French francs (Rs.3.89 crores) upto December 1987. The Ministry stated that the final prices arrived at were after negotiations. Also, it stated that the firm insisted on advance payment during negotiations. It added that the negotiations were conducted by experienced members of the negotiating committee who considered the prices reasonable.

A second consultancy contract was

entered into with firm 'B' in November 1986 for support of the multi-mode radar (MMR). In this case also, ADA have not indicated how the reasonableness of the price of 39.28 million Swedish kroner (SEK) (Rs.67.04 crores) was assessed. Nor has it indicated why an advance payment of five million SEK (Rs.0.85 crore) was agreed to and paid in December 1986 when actual interaction with the firm commenced only in January 1987. The Ministry have merely stated that the final price was seven percent less than the original offer and that the advance payment had to be agreed to as being part of the firm's proposal. The project definition phase in respect of the MMR which was to be completed by November 1987 was extended by a month and completed in December 1987. No assessment has been made by ADA of the implications of delay and no penalties were levied on the firm. A comparison of the performance figures calculated during the project definition phase and the actual requirements reveals that the MMR fell short of the requirement in an important capability. The rest of the requirements have been indicated to have been met reasonably. The Ministry have stated that the performance acceptability of the MMR in terms of the ASR was currently under examination by Air HQ. The Ministry had stated in October 1987 in response to an Audit paragraph appearing in the Report of the Comptroller and Auditor General of India, Union Government (Defence Services) for the year ended 31 March 1987, No.2 of 1988 on the Multi-mode Fire Control Radar being developed indigenously that while the equipment was unsuitable for all existing types of aircraft with the IAF, it would be used as a working model for the LCA. Against this background, ADA has not indicated why it was not possible to initiate indigenous development of the MMR and seek expert association in only limited and critical areas. Nor has it been clarified as to what extent the experience gained in the earlier foreclosed project has been used or is proposed to be

used in the LCA project. The Ministry stated that the association of experts in limited and critical areas was under examination by a high power committee.

In respect of the two contracts with firm 'A' and firm 'B' for the project definition phase, ADA has not indicated the manner in which the actual evaluation was done and whether sound techno-economic criteria were adopted before awarding the contracts. Audit is, therefore, unable to confirm that the contracts were awarded with due regard to existing procedures and with economy and efficiency. The Ministry, while responding to this comment, have said that the contracts were awarded after the technical competence of the firms had been confirmed and the economics established. No information, however, was provided as to how this was actually done.

50.11 Development of Full Authority Digital Electronic Control System (FADEC)

The project cost of Rs.560 crores sanctioned by Government for the LCA programme included an amount of Rs.3 crores for the incorporation of a FADEC in the indigenous engine system of the proposed LCA. No action was taken on this system until February 1985 when the Ministry accorded sanction to the GTRE undertaking the project at a cost of Rs.8.96 crores (Rs.5.19 crores in foreign exchange) within five to six years. GTRE was also allowed to enter into a development contract with HAL for this purpose. This was done in April, 1985. An amount of Rs.5.8 crores had been paid to HAL by GTRE against this contract upto December 1987. However, ADA have not indicated the present progress of work on this project and whether it is commensurate with the payment made to HAL so far. The Ministry, without indicating the extent of progress made towards the development, stated that the payment made to HAL has been linked with the progress of work as per

the contract.

50.12 Engine for LCA

In regard to the engine for the LCA, a contract worth US \$55.74 million (Rs.66.24 crores) with a foreign firm 'C' was signed by the ADA in October 1986 for the supply of 11 engines for the programme. It was proposed to power the prototype version of the aircraft with this engine and install the indigenously developed engine by GTRE on the production version of the LCA. Payments totalling US \$ 17.3 million (Rs.20.93 crores) have been made to the firm by ADA upto December 1987.

In order to meet the performance requirements in the ASR, the GTRE submitted a feasibility report on an engine being developed by it. The proposal was accepted by the governing body of ADA. The estimated cost of the project was indicated at Rs.405 crores over a seven to eight year period presuming that sanction is accorded in 1988. However, sanction had not been accorded by Government until July 1988. The Ministry stated that the Government have since approved the proposal for sanction of the engine and the production of the engine is likely to commence in 93 months from the go-ahead date as per current plans. Assuming that the project will be sanctioned by the end of 1988, it is expected to be completed only by 1996. The production version of the engine will not be available until 1997 leading, thereby, to a mismatch between production of the aircraft and the availability of an indigenous engine. This would need to be reviewed by Government both in the context of continued dependence on an imported engine as well as the high costs of such imports.

50.13 Weapons

According to a paper submitted to Government in June 1981, the LCA was to be armed with the most modern weapons such as laser guided bombs, stand-off mis-

siles and cluster bombs. In this context, there appeared to be no indication whether the development of weapons indigenously or, alternatively, their import, was being considered and programmed to synchronise with the availability of the aircraft. The Ministry stated that this aspect is being examined and a clear picture regarding indigenous development will emerge at the end of the PDP.

50.14 Manpower for LCA

The manpower requirement for the ADA was reviewed and it was noticed that the build-up of skilled as well as administrative manpower was slow. Taking into account the manpower obtained on deputation from various organisations, it was expected that a core staff was essential for periods much longer than normal deputation periods to meet the functional requirements of the ADA. It was agreed in January 1985 that 74 technical staff and 126 administrative staff were required immediately. Thereafter, in June 1986, the strength of the technical staff was increased to 174. Obviously, it was not possible to take steps to fill in such a large increase in posts over a relatively short period. Manpower deficiency as a percentage of staff in position *vis-a-vis* staff authorised came down from 97.3 per cent in March 1985 to 14.3 per cent in January 1988 in respect of technical staff. The improvement, however, was not as significant in respect of administrative staff where the deficiency over the same period was brought down from 99.2 to 44.4 per cent. The Ministry stated that the PDP has not suffered for want of technical manpower. This statement, however, needs to be viewed in the context of the fact that the PDP has been delayed by more than two years.

50.15 Utilisation of grants by ADA

The ADA commenced functioning as a self accounting unit only from October 1985. In January 1986, sanction was accorded by the Ministry for the ADA to draw

grants-in-aid from DRDO each year for implementing the project and for meeting expenses incurred by the Director General, ADA to run his office as well as for making payments to other agencies in accordance with rules and regulations laid down by the governing body. It was noticed, however, from data in respect of grants-in-aid sanctioned between 1985-86 and 1987-88 that while the total grants-in-aid sanctioned amounted to Rs.111.58 crores, the amount spent upto January 1988 was only Rs.71.24 crores. The Ministry, however, gave no reasons for the underutilisation of committed funds to the extent of Rs.40.34 crores over a three year period.

50.16 Advance payments to HAL

It was noticed that advance payments amounting to Rs.42.50 crores had been made upto March 1988 to HAL, for setting up infrastructural facilities for the project. Of this, the expenditure incurred by HAL upto March 1988 was only Rs.29.55 crores. ADA have not replied to an Audit query as to whether HAL had furnished details of infrastructural facilities to be set up and plant and machinery proposed to be procured together with the details of cost estimates and whether these had been scrutinised by ADA before releasing funds. Similarly, ADA has not stated whether the progress of setting up of infrastructural facilities work has been regularly monitored. It has, therefore, not been possible for Audit to ascertain whether the advances had been paid on a rational basis and determine the reasons for wide variations between advances paid and expenditure incurred between 1985-86 and 1987-88. The Ministry, nevertheless, stated that the releases were made based on only the assessed requirement and that progress is being monitored by a Committee constituted for the purpose.

50.17 Accounting procedure of ADA

Although the accounting procedures approved for the ADA contemplated finan-

cial stock taking to be carried out monthly in respect of the project indicating physical completion of works vis-a-vis financial outlays made so as to facilitate decision making by the management, no financial stock taking had been carried out at any time since the inception of the ADA. The Ministry stated that the manual of budget and accounts of the ADA was formally approved for introduction from June 1987. The regular monthly stock taking is proposed to be introduced during the development phase (after completion of PDP). Clearly, an important tool of financial and performance monitoring had not been applied for no valid reasons.

50.18 Chief Executive of ADA

The Memorandum of Association of the ADA prescribes that the Director General will be the Chief Executive and will be responsible for the proper administration of the affairs and funds of the society and for coordinating and generally supervising the overall activities of the society. The first incumbent of the post who assumed office in July 1984 resigned in November 1985. No successor has since been appointed (November 1988). The functions of the Director General are being looked after by the Secretary, Department of Defence Research and Development as an additional charge from Delhi whereas the project office is located in Bangalore. Clearly, the absence of a full time Chief Executive for a period of over 30 months would have had a serious impact not only on the overall functioning of the ADA but on the particular implementation of the LCA project. The Ministry stated that while the need for a suitable full time Director General is accepted, alternative arrangements had to be made owing to unavoidable circumstances.

50.19 Project monitoring

Project monitoring was examined and found to be inadequate. According to Article 39 of the Memorandum of Association

of ADA, the governing body was to meet as frequently as necessary but not less than four times in a year. It was seen, however, that during the period January 1984 to January 1988 only eight meetings of the governing body had been held. In fact, only one meeting was held in 1987. More seriously, in none of the meetings of the governing body were important aspects relating to slippages in project execution and the absence of financial stock taking discussed with a view to taking corrective measures. Monitoring at the apex level, therefore, was grossly inadequate and contributed, possibly, to project delays. The Ministry stated that the exact time frames for various activities can only be indicated when the PDP is over. A system of reporting the monthly progress of the project to the members of the governing body *vis-a-vis* the targets now set has been introduced.

Article 7 of the bye-laws of the ADA states that there shall be Project Review Boards chaired by a Programme Director. The Boards are to meet periodically to discuss the progress of work issued in the form of work packages to various organisations. These review meetings are technical in nature where adherence to stipulated time schedules and cost estimates are discussed in addition to technical matters. It was seen from data provided by the Ministry in October 1988 that none of the five project review boards had met on more than two occasions since June 1984 when the ADA was constituted. As the Ministry itself has indicated technical complexities as one of the factors responsible for delaying the project, it is doubtful whether middle level monitoring has been adequate and effective.

The project is badly delayed. Although the project definition phase was to be completed by July 1986 in terms of projections made in the final feasibility report, this phase had not been completed even five years after the issue of Government sanction in August 1983. It is relevant to note, in this

context, that at the time when Government sanction was obtained in August 1983, the Ministry had stated that induction of the LCA into squadron service would commence from 1990-91. Subsequently, in May 1985, the feasibility report stated that the LCA could be inducted into operational service only by July 1994. As stated by the Ministry in October 1988, the induction of the LCA

would be possible only by 1996. Since the need to adhere to the time schedule had been reiterated by the Government on several occasions this aspect needs to be reviewed both to determine corrective measures as well as to consider alternative arrangements to meet the requirements of the IAF from 1990 onwards.

NEW DELHI

4 APR 1989

Dated the

Baldev Rai

(BALDEV RAI)

Director of Audit, Air Force & Navy

Countersigned

NEW DELHI

4 APR 1989

Dated the

T.N. Chaturvedi

(T.N. CHATURVEDI)

Comptroller and Auditor General of India

