

REPORT  
OF THE  
COMPTROLLER  
AND  
AUDITOR GENERAL OF INDIA

UNION GOVERNMENT

NO. 12 (COMMERCIAL) OF 1989

PAWAN HANS LIMITED

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## TABLE OF CONTENTS

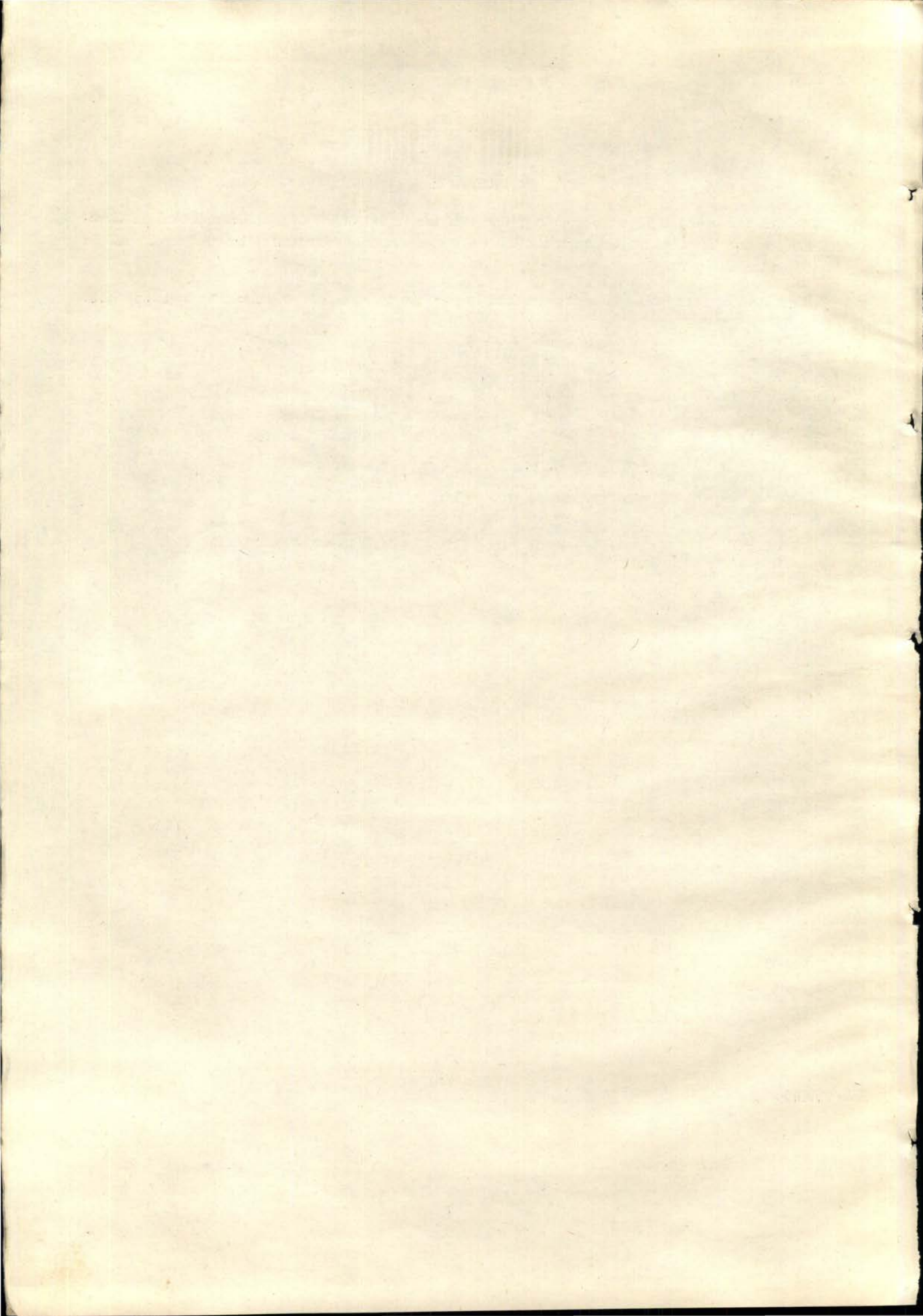
Para No.		PAGES
	PREFACE	(iii)
	Overview	(v)
1	Introduction . . . . .	1
2	Acquisition of Helicopters . . . . .	1
2.1	Preliminary selection . . . . .	1
2.2	Calling for tenders . . . . .	1
2.3	Evaluation— technical and financial . . . . .	1
2.4	Fresh flight trials . . . . .	3
2.5	Fresh assessment of helicopter demand . . . . .	4
2.6	Deliberations of Public Investment Board . . . . .	4
2.7	Final decision of the Government on pattern of acquisition . . . . .	5
3	Deployment of helicopters . . . . .	6
4	Surplus acquisition of 6 Dauphin helicopters for VVIP use . . . . .	6
5	Utilisation of the fleet . . . . .	7
6	Repairs and maintenance . . . . .	8
7	Cost of repairs and maintenance . . . . .	9
8	Loss of helicopters . . . . .	10
9	Capital Structure and financial results . . . . .	10
10	Insurance of helicopters . . . . .	10
11	Shortage of trained manpower . . . . .	11



## PREFACE

A reference is invited to prefatory remarks in Part I of the Report of the Comptroller and Auditor General of India, Union Government (Commercial), 1989 wherein mention was made that this report will be presented in several parts.

2. This Part contains points of interest noticed in purchase and operation of helicopters by Pawan Haas Ltd.



## OVERVIEW

This Audit Report contains a review on purchase and operations of helicopters by Pawan Hans Limited. The significant Audit findings are summarised below:

I. The Helicopter Corporation of India (now Pawan Hans Limited) was incorporated on 15th October 1985. Prior to the formation of the Corporation and as early as 1977, the long-term requirements of ONGC and IAF for helicopters were examined by a Committee of Secretaries. Thereafter, an expert committee of IAF and ONGC short-listed the following helicopters after examining the helicopters available world wide:—

- (i) SA 365 N (Dauphin) manufactured by Aerospatiale, France
- (ii) S. 76—manufactured by M/s. Sikorsky, U.S.A.
- (iii) Bell 412—manufactured by Bell Helicopters, USA.

Subsequently, the list was enlarged to include WG-30 helicopter, which was still under development by M/s. Westland U.K. (Para 2.1.1.)

II. A Negotiating Committee under the Chairmanship of Defence Secretary invited detailed offers from the four manufacturers in October 1982. Evaluation trials of these helicopters (other than Westland) were conducted in January/February, 1983. They were found technically acceptable. A Prototype of Westland helicopter was offered for evaluation in September, 1983 and a production model could be brought to India for flight trials only in December, 1984. This delayed the procurement decision considerably. The final decision on this proposal, which was initiated in 1977, could be taken only in March, 1986. In the meantime, ONGC continued to hire helicopters from foreign suppliers for its offshore operations (Para 2.2 and 2.3.1.).

III. During flight trials on prototype of Westland helicopter conducted in September/October, 1983, certain inadequacies were observed which M/s. Westland assured to rectify them in their final production model. The Negotiating Committee did not favour the Bell and Sikorsky helicopters of U.S. origin on the plea that there could be problems of ensuring uninterrupted product support. The Negotiating Committee also noted that the total project cost of Dauphin was the least and the cost of Westland the highest (Para 2.3.2 and 2.3.3.).

IV. The U.K. Government had offered earlier a grant of £65 million for Westland. The French Government offered French Economic Aid and 6 heli-

copters free of cost for Dauphin helicopters. The initial capital cost of Westland package stood less by Rs. 20.37 crores, compared with the Dauphin. The Negotiating Committee, recommended (March, 1984) purchase of Dauphin helicopter on technical, operational, safety and life cycle cost considerations and the Ministry of Defence endorsed (May, 1984) this recommendation. However, based on the suggestion of the Ministry of Finance to reconsider the recommendation mainly on the ground that the saving in the capital cost of Westland helicopter would off-set its higher operating cost, the flight evaluation of the production model of the Westland was also carried out.

The production model arrived in December, 1984 and flight trials with production model undertaken in sequel to the suggestion of the Ministry of Finance brought out that the said helicopter did not meet the following technical requirements.

- (i) Zero risk during take-off.
- (ii) Minimum pay-load.

The British Government subsequently offered (June 1985) a subsidy of £ 2.75 million per year for 14 years amounting to £ 38.5 million (Rs. 61.62 crores) to compensate the higher operating cost (Paras 2.3.4. to 2.3.9.).

V. Meanwhile, the Helicopter Corporation of India Ltd. (now Pawan Hans Limited) was decided to be formed by the Government of India under the administrative control of the Ministry of Civil Aviation and consequently the matter relating to purchase of the helicopter was transferred to them. This Ministry constituted a technical team consisting of representatives of DGCA, IAF and Indian Airlines to carry out fresh trials on Westland helicopter. The team conducted trials in September, 1985 and concluded that the helicopter conformed to the requirements of 'zero risk' and 'minimum pay-load'. As this trial was conducted with 9 persons (2 crew + 7 passengers) as against the minimum requirement of 10 passengers, another technical team again conducted flight trials in November 1985 to establish load factor with 13 persons aboard. The helicopter was cleared in this trial but 'zero risk' trial was not conducted again by the team on the ground that the same was already done in September, 1985. However, any test to establish 'zero risk' factor can not be said to be complete unless it is carried out with minimum pay load requirement.

(Para 2.3.10 to 2.4.4.)

VI. Apart from six helicopters required for VVIP communication squadron of the Air Force, the requirement of ONGC was initially assessed at 12 helicopters. ONGC's requirement was, subsequently, increased to 21 helicopters in June, 1983. A fresh assessment of

helicopter requirement was again made in 1985 when the demand of ONGC was increased to 25 and a demand of 17 helicopters for non-oil sector was also projected for the first time. The Ministry of Civil Aviation proposed (January 1986) purchase of 21 Westland helicopters and 27 Dauphin helicopters (including 6 helicopters for Air Hqrs.) covering the requirements of oil and non-oil sectors (Para 2.5 to 2.6.2.).

VII. The Public Investment Board in March 1986 after considering the proposal recommended acquisition of 25 helicopters for the Oil Sector and 6 Dauphin helicopters for the AHQCS, as it felt that the demand for the non-oil sector had not been established. The PIB noted that the preference of ONGC was for smaller helicopter and that the decision on fleet mix of 12 Dauphin and 13 Westland helicopters for oil-sector had been taken before evaluating their need for different types of helicopters. The Ministry of Civil Aviation, however, advocated the acceptance of its proposal for acquisition of 42 helicopters in toto. Nevertheless, the Ministry of Civil Aviation indicated that in case only 21 helicopters were to be bought, its preference would be for Dauphin helicopter on techno-economic and operational considerations. The Government finally decided to purchase 21 Westland and 27 Dauphin helicopters and the agreements were signed in March, 1986. The total cost of the helicopters was Rs. 259 crores (£70 million and FF 547 million) (Paras 2.6.3 to 2.7.3).

VIII. Out of the 42 helicopters received by the company for its own operations, it could hardly deploy 25 helicopters (as on March 1989). Taking into account maintenance reserve at 20% of the regular fleet of 39 existing helicopters as on 31 March 1989, the Company has at least 6 helicopters surplus to its requirement. This has resulted in extra expenditure to the extent of Rs. 33.68 crore. In addition, the six helicopters costing Rs. 25.77 crore, which were purchased for Air Headquarters Communication Squadron and which the Ministry of Defence ultimately declined to accept, are also lying idle from December, 1987 (Para 3.1 to 4.2).

IX. As against the average utilisation of 100 hours per month envisaged in the Project Report, the actual utilisation of Westland helicopters was around 40 hours and that of Dauphin helicopters 55 hours per month during the period from September, 1986 to March 1989. The Company stated that the average utilisation of helicopters depended upon the requirement of customers. However, in terms of flying hours the company was able to fulfil the demand of ONGC to the extent of 86% and 98% in the case of Westland

and Dauphin helicopters respectively. As regards the contractual demand of ONGC for Bombay off-shore in terms of number of days for which helicopters were required to be provided by Pawan Hans, the level of satisfaction was 72 per cent in case of Westland and 90 per cent in case of Dauphin during 1988-89. This necessitated ONGC hiring helicopters from Indian Air Force ranging from 30 hours to 130 hours a month. It would thus be observed that although the company had surplus helicopters, it could not meet the demand of ONGC fully at Bombay (Paras 5.1 to 5.4).

X. Westland helicopters experienced 342 reportable defects and six Westland helicopters were grounded for 20 times each for such defects between December, 1986 to March 1989; there were 46 reportable defects in Dauphin helicopters over the same period of time. The incidence of unscheduled repair works out to one after 51 hours of flying in the case of Westland and 619 hours of flying in case of Dauphin. Manufacturers took unduly long time in repairing engines which were withdrawn prematurely. Ten engines in case of Westland and three engines in case of Dauphin took more than six months for repair. While the cost of maintenance and repair per flying hour was initially estimated (February 1986) at Rs. 5901 for Westland and Rs. 3981 for Dauphin, it subsequently increased considerably and was estimated by the manufacturers (February 1989) to be Rs. 21588 for Westland and Rs. 9375 for Dauphin. The company has lost three helicopters due to accidents upto March, 1989. Two of these helicopters were Westland and one Dauphin. (Paras 6.1 to 6.4, 7.2, 7.4 and 8).

XI. In the original Public Investment Board proposal the Company had estimated a loss of s. 4.30 crores in the first year of its operation and profits thereafter. As against this, the Company has incurred a loss of Rs. 7.12 crores in the year 1986-87 and Rs. 7.44 crores (provisional) for 1987-88. A loss of Rs. 7.89 crores is estimated during 1988-89 and there is no possibility of the Company breaking even in the near future (Para 9.2).

XII. The Company is constrained by a severe shortage of pilots and engineers. As against Company's requirement of 140 pilots and 73 engineers, they had only 92 pilots and 20 engineers in position (March 1989). Due to acute shortage of engineers, the Company is forced to obtain temporary exemption from Director General of Civil Aviation for allowing its technicians to sign flight release certificates. (Para 11.1 & 11.2).



## A REVIEW ON PURCHASE AND OPERATIONS OF HELICOPTERS BY PAWAN HANS LIMITED

### 1. Introduction

The Helicopter Corporation of India Limited was formed in October, 1985 and subsequently re-named as Pawan Hans Limited. Initially, it was formed primarily to meet the overall requirement of the Oil Sector with helicopter support services to meet the needs of Oil and Natural Gas Commission which had till then relied mostly on foreign charterers and Indian Air Force for these services. The Company was also to operate scheduled/non-scheduled services in inaccessible area and difficult terrain and provide inter-city transportation and tourist charters. The Company acquired 42 helicopters during 1986—88 for the above operations; 6 helicopters were also acquired for Air Headquarters Communication Squadron. The salient features noticed by Audit during the study of the selection and purchase of helicopters, their deployment, utilisation, repair and maintenance are given in the succeeding paragraphs.

### 2. Acquisition of Helicopters

#### 2.1 Preliminary selection

2.1.1 Long-term requirements of providing support for off-shore operations of the ONGC as well as the requirement of helicopters for VVIP communication squadron of the IAF were examined by a Committee of Secretaries in 1977. The Committee recommended that IAF should provide helicopter support to off-shore operations of the ONGC on a long-term basis and a common twin-engined helicopter suitable for meeting both ONGC requirement as well as the needs of VVIP transportation be procured and placed at the disposal of the IAF for meeting these commitments. Accordingly, IAF and ONGC jointly finalised their requirement which was to form the basis for selection of helicopters by a joint IAF and ONGC Committee. This Expert Committee examined the helicopters available world-wide and narrowed down its choice (in June/July, 1980) to the following three helicopters :—

1. SA 365 N (Dauphin)—manufactured by Aerospatiale, France.
2. S 76—manufactured by M/s. Sikorsky, USA.
3. Bell 412—manufactured by Bell Helicopters, USA.

Subsequently the list was enlarged to include WG—30 helicopter offered by M/s. Westland. The WG—30 helicopter was then still under development.

2.1.2 A proposal for procurement of 6 helicopters for the Air Headquarters VVIP communication re-

quirements and 12 helicopters for ONGC was approved by a Cabinet Committee in August, 1982. Subsequently (June, 1983) the ONGC's requirement was increased to 21 helicopters.

#### 2.2 Calling for tenders

It was decided that a Negotiating Committee under the Chairmanship of Defence Secretary be constituted for procurement of helicopters. The Committee, in October, 1982, invited the four manufacturers to submit their detailed offers, covering commercial and technical aspects. They were also asked to position their helicopters in India for flight evaluation. The technical requirements were specified by Air Headquarters in a document called the Air Staff Requirement (ASR 1/79), which contained the parameters against which the suitability of helicopters could be evaluated. The main features of the ASR communicated to the manufacturers, were that the helicopter should :

- (a) be able to carry a minimum of 10 passengers;
- (b) have a cruising speed of not less than 185 Km. per hour;
- (c) have a gross weight of 5 tons; and
- (d) be able to climb away with a height loss of not more than 15 metres in case of engine failure at transition. It should be capable of continuous cruise at 610 metres above mean sea level and carry out a safe single engine landing on deck. (Single engine performance).

#### 2.3 Evaluation—technical and financial

2.3.1 The evaluation trials of the helicopters of all manufacturers except that of M/s. Westland were conducted in India during the months of January/February, 1983. They were found technically acceptable. M/s Westland could not, however, bring their helicopter for evaluation as it was still under development. They offered a prototype of WG—30 for evaluation in India during the last week of September, 1983. The Negotiating Committee thus waited for a period of 7 months even for the prototype of WG—30 to be brought to India. But the production model could be brought to India for flight trials only in December, 1984. Consequently the procurement decision was considerably delayed. In the event the final decision on a proposal, which was initiated in 1977, could be taken only in March, 1986. In the meantime, ONGC continued to hire helicopters from foreign operators for its off-shore operations.

2.3.2 The WG—30 prototype was brought for flight evaluation from 26-9-1983 to 3-10-1983. Certain inadequacies observed in the prototype were detailed in the evaluation report. M/s. Westland, however, assured that these deficiencies, would be rectified in the final production model. The evaluation team felt that removal of such defects would be checked when a suitable production model of helicopter was made available. Subject to verification of the claimed improvements, WG—30 was considered suitable for the ONGC off-shore and VVIP executive roles.

2.3.3 The Negotiating Committee in October, 1983 discussed the offers from the four manufacturers. The Committee, however, noted that while Bell and Sikorsky had offered very good delivery schedules and were proven helicopters, there could be problems of ensuring un-interrupted product support, as had been experienced in some equipments of US origin. The Committee further noted that the total project cost as per quotation was least for Dauphin SA—365 N and highest for WG—30. But since Westland was accompanied by a grant from Overseas Development Assistance, the choice was narrowed down to WG—30 and Dauphin.

2.3.4 It may be mentioned that UK Government had offered to cover the procurement of WG—30 helicopters by an outright grant from the ODA, which made the procurement of Westland helicopters financially attractive. In order to remain competitive, the French Government also offered in January, 1984 that the entire transaction could be covered under French Economic Aid and also agreed to provide 6 VVIP helicopters free of cost. The salient features of packages offered by the two manufacturers were as under :

(March, 1984)

	Westland	Dauphin
	(£ in million)	(FF in million)
	(Rs. in crores)	(Rs. in crores)
	for 27]	for 27
	helicopters	helicopters
Package cost	£ 87.44	FF 621.599
	(Rs. 134.33)	(Rs. 79.57)
Grant element	£ 65.00	FF 192.696
	(Rs. 99.84)	(Rs. 24.67)
Net value of package	£ 22.44	FF 428.903
	(Rs. 34.53)	(Rs. 54.90)

Differential in capital cost Rs. 20.37 crores.

2.3.5 In March, 1984 the Negotiating Committee unanimously recommended purchase of the Dauphin SA 365 N for both VVIP and ONGC operations on technical, operational, safety and life cycle cost considerations. It was noted by the Committee that WG—30 had presently CAA\* certification for operating only in temperate climates. Full flight CAA clearance was a pre-requisite to procurement in view of Indian conditions. It was also mentioned that for VVIP operations the Air Force wanted only a proven helicopter and WG—30 despite its more comfortable cabin arrangement, would not be as suitable as Dauphin. It was noted by the Committee that the operating cost of Westland fleet was considerably higher than that of Dauphin (Rs. 3 crores per annum) and therefore the advantage in its procurement cost (Rs. 20.37 crores) would be set off within a period of less than 7 years by its higher operating cost. Based on the recommendations of the Negotiating Committee, Ministry of Defence recommended purchase of Dauphin helicopters in May, 1984 and sought the concurrence of the Ministry of Finance. Ministry of Finance, however, felt (June, 1984) that the Ministry of Defence should reconsider the recommendations as there would be saving on capital cost of Westland helicopter which will offset its higher operating cost.

2.3.6 On re-examination, the Ministry of Defence expressed their view (June, 1984) that if Westland helicopter is to be purchased it should be *inter alia* subject to following conditions :

- procurement action would be undertaken only after full envelope flight certification has been obtained by M/s. Westland by September, 1984.
- a production model of WG—30 should be immediately brought to India for flight evaluation. Purchase action would only follow evaluation of the production model.

2.3.7 The production model of the helicopter was brought to India in December, 1984 for flight evaluation after full envelope flight certificate was obtained from CAA (UK) in November, 1984. The flight evaluation was conducted at Bombay from 14th to 20th December, 1984 by an Indian Air Force team. Certain deficiencies were noticed during evaluation and brought to the notice of M/s. Westland during the period January to April, 1985. The helicopter fell short of requirements in the following two technical areas :

- the trials showed that there was a risk period of 3-4 seconds while taking off from a off-shore platform in case of a single engine failure; and
- the WG—30 was also not able to lift 10 passengers under ISA plus 20°C conditions. It could only lift 9 passengers.

\*Civil Aviation Authority, UK.

Subsequently on 22nd April, 1985 the Air Headquarters informed M/s. Westland that the helicopter does not meet the stipulated parameters of the A.S.R.

2.3.8 The Government of India was informed on 27-4-1985 that Westland had established after further flight trials in Britain that the "zero risk" could be achieved at weights and temperatures required by means of a slightly modified take-off procedure from the rig. The UK Civil Aviation Authority had given its approval to this procedure and the flight manual was being amended accordingly. It was further claimed that WG-30 could perform the full ONGC mission and could carry 10 passengers to an off-shore platform.

2.3.9 The matter was again examined by Air Headquarters and they reiterated (May, 1985) the stand taken earlier that M/s. Westland were not able to demonstrate "zero risk" during trials in India and that this deficiency was accepted by them during discussions. It was also pointed out that the manufacturers had accepted that a payload penalty was unavoidable to bring the risk period to zero. Further the mission weight calculated by Westland was incorrect and maximum take-off weight would be less than the mission weight calculated by M/s. Westland. In view of the technical snag in WG-30, a question arose whether negotiation with M/s. Westland should continue. The Ministry of Defence was advised in June 1985 that dialogue might continue.

While the dialogue for suitability of WG-30 was going on, the British Government came out (25-6-1985) with an additional offer of subsidy of £ 2.75 million per year for 14 years (commencing from 7th year) amounting to £ 38.5 million (Rs. 61.62 crores) which would compensate the additional operating cost of this helicopter over its life time. The proposal was examined in consultation with Ministry of Finance, who suggested that it would be preferable to receive a lump-sum payment amounting to £ 11.4 million (Rs. 18.3 crores) on account of difficulties in implementation of the proposed arrangements involving a period of 20 years. The Ministry of Finance further amplified that the question was not so much of compensation of the additional operating cost of Westland helicopter but the Ministry of Defence should first satisfy itself about technical soundness and safety of the helicopter.

2.3.10 Meanwhile the Government decided to form a separate corporation for helicopter support services under the administrative control of Ministry of Civil Aviation, (the corporation named Helicopter Corporation came into effect in October 1985). It was also decided to transfer this exercise relating to purchase of helicopter to Ministry of Civil Aviation.

#### 2.4 Fresh Flight Trials

2.4.1 The Ministry of Civil Aviation constituted a technical team consisting of the representatives of the Director General of Civil Aviation, test pilots from HAL, Indian Air Force and Indian Airlines to carry

out fresh flight trials of WG-30 after some modification had been made by the manufacturer. The trials were carried out on 12th September, 1985 at Bombay. The team concluded that:

- (a) WG-30 is considered well within limits to perform from a zero risk for a take-off from the helicopter rig in case of one engine failure; and
- (b) WG-30 can carry a minimum payload requirement of 10 passengers for a standard mission profile.

2.4.2 It may be mentioned that this test was carried out with 9 persons (2 crew + 7 passengers) on board, whereas ONGC mission requirement was for a minimum of 10 passengers. As the ONGC requirement stipulated that the helicopter should carry 10 passengers with their normal baggage to a rig 100 nautical miles away and return to the base without having to re-fuel at the rig, it was decided by the Ministry of Civil Aviation to carry out a further test with full complement of crew and passengers on board, associating the members of the team that conducted September 1985 trials.

2.4.3 Accordingly, on 21st November, 1985 flight trials were conducted by another technical team with 13 persons on board. This team concluded that the Westland helicopters met the requirement of ONGC in respect of load factor. The team, however, did not carry out trials to establish "zero risk" factor as it felt that the same had already been done in the flight trials of September 1985.

The Ministry in reply to draft audit review suggested in January 1990 that the last sentence of this para might be substituted as under:

"The team, in their report, observed that the maximum take-off and landing weight at the rig under category 'A' which takes engine failure into account at zero speed is restricted to 11,500 pounds and that since zero speed safety test at a higher all-up weight of 11,900 pounds had already been done during trials in September 1985, this test was not considered necessary."

The audit is for obvious reasons unable to agree with this view. The trials of 12-9-1985 and 21-11-1985 had the following features:

12.9.85	' 9 passengers including crew (Load factor stated to be 11,900 lbs..	' 'zero risk' test carried out.
21.11.85	, 13 passengers including crew (Load factor stated to be 11,500 lbs.	, No 'zero risk' test carried out.

Firstly, it is not clear how the load with 13 passengers on board could be only 11,500 pounds whereas

the load with 9 passengers on board is stated to be 11,900 pounds. Secondly there has been no test of both the load and 'zero risk' factors in one single test flight; only one aspect has been tested at one time. Thirdly, the requirement of the ONGC was in terms of minimum ten passengers with baggage and not in terms of load factor based on 'average' weight of passengers.

2.4.4 From the above it may be seen that the first test which established "zero risk" was carried out without the required 10 passengers on board. The second test established "load factor" without carrying out the "zero risk" test.

Although the team which carried out the second test in November 1985 did not carry out trials to establish 'zero-risk' factor on the ground that the same was already done in September 1985, it has to be accepted that safety is a very critical requirement in aviation. Any test to establish 'zero-risk' factor cannot be said to be complete unless it is carried out with minimum pay-load requirement. In the circumstances, how the Ministry of Civil Aviation or the Air Headquarters satisfied themselves about the technical and operational suitability of this helicopter is not clear.

## 2.5 Fresh assessment of helicopter demand

While the purchase of helicopters was under consideration in the Ministry of Defence, the total demand was assessed at 27 helicopters—21 for ONGC role and 6 for VVIP role. Following the establishment of Helicopter Corporation of India, the requirement of helicopters for the Oil Sector was again reviewed. A committee under the chairmanship of Managing Director of Indian Airlines assessed the requirement of helicopters to meet the demand in Oil Sector based on workload of March, 1985 as 35 helicopters (13 medium, 20 small and 2 for helirigs. Regarding non-oil sector, a Feasibility Survey Report was prepared by Indian Airlines which assessed the requirement at 23 helicopters. These estimates were reviewed by Ministry of Civil Aviation and they finally placed the requirement of the non-oil sector at 17 and oil sector as 25 helicopters making the total demand of 42 helicopters. In addition, 6 helicopters were needed for VVIP communication squadron of the Indian Air Force. Demand for non-oil sector was thus considered for the first time at this stage.

## 2.6 Deliberations of Public Investment Board

2.6.1 A memorandum containing detailed proposals for purchase of 21 Westland and 27 Dauphin helicopters for consideration of the PIB was initially prepared by the Department of Civil Aviation in January 1986.

2.6.2 A number of issues were raised by the various appraising agencies in the pre-Public Investment Board meeting held on 18th February, 1986. In the light of their comments, the PIB memo was suitably revised

and the approval of PIB was sought on the following proposals:

- (a) Acquisition of 21 Westland-30 helicopters alongwith the related spare engines, spares, ground support equipment, infrastructural facilities, etc. by the Helicopter Corporation of India at a total estimated cost of Rs. 168.38 crores with a foreign exchange component of Rs. 122.50 crores.
- (b) Acquisition of 27 SA 365 N 2 Dauphin helicopters alongwith related spare engines, spares, ground support equipment, infrastructural facilities, etc. from Aerospatiale of France at a total estimated cost of Rs. 108.57 crores with a foreign exchange component of Rs. 82.09 crores, and the recovery from the Indian Air Force of the proportionate cost (Rs. 18.24 crores) of 6 SA 365 N Dauphin 2 helicopters in the executive configuration alongwith the related spare engines, spares, ground support equipment etc. intended for the Air Headquarters Communication Squadron.

Thus the estimated cost of procurement of each helicopter, together with related spares was Rs. 8.02 crores in case of Westland and Rs. 4.02 crores in case of Dauphin.

2.6.3 The PIB met on 11th March, 1986 to consider the above proposal. The PIB felt that the demand of 17 helicopters for non-oil sector had not been conclusively established. Further, in its view the scope of deployment and utilisation of helicopters in the non-oil sector, on a commercial basis, appeared to be necessarily limited and also mentioned that the wetleasing of 17 helicopters by States and Union Territories could impose a heavy financial burden on them (estimated at Rs. 68 crores). The PIB noted that while the preference of the Oil and Natural Gas Commission was for smaller helicopters, the fleet mix of 12 Dauphin and 13 Westland helicopters was acceptable to them provided the lease charges were comparable to the rates presently paid by them. The PIB also pointed out that the decision on the fleet mix had been taken before evaluating the need of the oil sector for different types of helicopters. The analysis made by the Public Investment Board noted that the project was economically unviable as its economic IRR (Internal Rate of Return) was negative. Even after adjusting the grant element for the Westland helicopters, the economic IRR was only around 5%.

2.6.4 In view of the above, PIB decided to recommend to the Cabinet the acquisition of 25 helicopters for catering to the demand of oil sector and 6 Dauphin helicopters for the Air Headquarters Communication Squadron. The PIB did not make and recommendations for purchase of helicopter for non-oil sector and decided to leave the question to the Cabinet. The Ministry of Civil Aviation strongly

advocated the acceptance of the proposal in toto (27 Dauphin and 21 Westland). That Ministry, however, indicated that in case only 21 helicopters were to be bought, its preference would be for Dauphin helicopter on techno-economic and operational considerations.

## 2.7 Final decision of the Government on pattern of acquisition

2.7.1 The Government finally decided to purchase 21 Westland and 27 Dauphin helicopters. Agreements for their purchase were signed on 15th March, 1986 for Westland and on 31st March, 1986 for Dauphin helicopters respectively.

2.7.2 The following table gives the project cost as envisaged in the original PIB memorandum and the estimated project cost as on March, 1988 in the revised cost estimates prepared by the company.

	Original estimates		Revised estimates		Excess(+) Saving(-) (Rupees in Crores)
	Foreign exchange cost (Million)	Equivalent Indian Rupees (Crores)	Foreign exchange cost (Millions)	Equivalent Indian Rupees (Rupees in Crores)	
<i>Foreign Exchange</i>					
1. Acquisition of 21 Westland helicopters and related spares/ground support equipment . . . . .	£65.00	113.75	£65.00	130.97	(+) 17.22
2. Rolls Royce spares/ engines etc . . . . .	£5.00	8.75	£5.00	10.70	(+) 1.95
3. 27 Dauphin helicopters (including 6 VVIP) and related spares/ground support equipment . . . . .	FF 547.31	82.09	FF 547.31	117.41	(+) 35.32
		204.59		259.08	54.49
<i>Rupee Expenditure</i>					
4. Freight & handling . . . . .		1.88	..	1.50	(-) 0.38
5. Custom Duty . . . . .		66.48	..	0.65	(-) 65.83
6. Other support facilities (hanger, workshop, office furniture etc.)		4.00		6.87	(+) 2.87
Total expenditure . . . . .		276.95		268.0	(-) 8.85

The foreign exchange cost for purchase of helicopters went upto Rs. 259.08 crores from Rs. 204.59 crores mainly due to depreciation in the value of rupee vis-a-vis French Frank and Pound Sterling. It may, have also to be noted that Government completely waived the customs duty on the import of helicopter and their related spares which resulted in a saving of Rs. 65.83 crores for the Company.

2.7.3 It would thus be noted that :

- (i) The Ministry of Defence was earlier clearly of the view, that on technical, operational and safety as well as life cycle cost considerations Dauphin was the most suitable helicopter.

- (ii) The ONGC had also shown its preference for the Dauphin helicopters and the PIB, while considering investment proposal, had expressed its reservation on the manner in which the fleet mix for ONGC requirement was decided.

- (iii) While the Ministry of Civil Aviation strongly advocated the purchase of 48 helicopters, their clear preference was for Dauphin on techno-economic and operational considerations in case only 21 helicopters were to be purchased as recommended by the PIB.

Nevertheless, the Government decided to purchase 21 Westland and 27 Dauphin helicopters.

### 3. Deployment of helicopters

3.1 The Company received all the 21 Westland and 27 Dauphin helicopters (including 6 meant for VVIP squadron of Air Force) by 31st March, 1988. But during the one year period, i.e., between April 1988 to March 1989, out of 48 helicopters received it could deploy only 25 helicopters (including 2 helicopters used for the purpose of training of pilots and Casual Charters). Meanwhile during the one year period 3 helicopters crashed on 14-7-1988, 12-8-1988 and 7-2-1989 (2 Westland and 1 Dauphin) bringing the effective strength to 39 helicopters as on 31-3-89 excluding 6 VVIP helicopters. The deployment as on 31-3-1989 was as follows :

	Westland	Dauphin
Oil & Natural Gas Commission	6	10
Mizoram Government	1	—
Sihkim Government	1	—
Nagaland Government	1	—
Meghalaya Government	1	—
Andaman & Nicobar Islands Admn.	—	1
Lakshadweep Islands Admn.	—	1
Coal India Limited	—	1
Training and Charters	1	1
	11	14

3.2 In the original PIB memorandum a provision of 12% was anticipated for maintenance and training reserve. However, the Company subsequently contended that it requires 20% of the regular fleet for purposes of maintenance reserve alone. Taking the above into account, the level of deployment and the surplus of helicopters with the Company as on 31-3-1989 works out as under :—

Type of helicopters	No. of helicopters de- ployed	No. of heli- copters avail- able	Net avail- able after consi- dering provi- sion of 12%	Net avail- able after consi- dering provi- sion of 20%	Surplus to requirement	
					With refer- ence to 12% reserve	With refer- ence to 20% reserve
Westland	11	19	17	15	6	4
Dauphin	14	20	17	16	3	2
Total	25	39	34	31	9	6

Thus at least 6 helicopters (and their related spares) have been lying surplus to its present requirement resulting in idle investmetn of Rs. 33.68 crores in

foreign exchange. In reply the Management of Pawan Hans has stated that "based on actual operating conditions in the country, it is likely that he reserve for maintenance of helicopters may have to be increased to 30 %" and "they do not anticipate that there will be any sizeable number of surplus helicopters" (December, 1988). The reply of the company that they need a maintenance reserve of 30 % is not tenable as the original PIB memorandum had envisaged a reserve of 12 per cent and no organisation engaged in aviation business can reasonably afford to have as large as one-third of its fleet grounded as 'maintenance reserve'.

### 4. Surplus acquisition of 6 Dauphin helicopters for VVIP use

4.1 The PIB Memorandum for the acquisition of helicopters by Pawan Hans Limited in February 1986 had also assessed the requirements of 6 Dauphin SA-365 N helicopters for the IAF for use by the communication squadron for VIP/VVIP. After the signing of the purchase agreement, the Ministry of defence indicated that the limited number of 6 helicopters for VIP/VVIPs would pose maintenance and operational problems and hence declined to accept these helicopters and decided to go in for MI-17 helicopters. The matter regarding proposed utilisation of SA-365 N Dauphin helicopters for VIP/VVIPs was discussed in the meeting held in August 1987 by Secretary, Ministry of Civil Aviation where the representatives of the Planning Commission, Ministry of Finance, Ministry of Defence and Pawan Hans Limited were present. As Ministry of Defence, on behalf of whom 6 Dauphin helicopters for VIP/VVIP use were ordered had decided to go in for MI-17 helicopters, the meeting discussed whether it would be feasible to amend the purchase agreement so as not to buy these six helicopters. It was pointed out that since the letter of intent was issued as early as November 1985 and the manufacturers had already gone ahead with their production programme, it was too late to review the purchase order in August 1987.

4.2 Therefore, these additional six helicopters were also allotted to Pawan Hans Limited. The deliveries of the above six helicopters commenced in September 1987 and all the helicopters arrived in India by December 1987. The company has stated that these six helicopters are not being used by Pawan Hans Limited and some other agency will take over these helicopters shortly (December 1988). Thus, these six helicopters acquired at a cost of Rs. 25.77 crores in foreign exchange remained idle since December 1987.

4.3 The Ministry instructed Pawan Hans (June 1989) to transfer 4 of the six VIP helicopters to various State Governments. Pawan Hans has transferred two helicopters each to Governments of UP and Bihar and one each to Madhya Pradesh and Gujarat. They have however, received an amount of Rs. 8.82 crores against the sale of two helicopters and are in the process of recovering the balance amount.

### 5. Utilisation of the fleet

5.1 At the project Report stage it was envisaged that on an average each helicopter would fly for

about 100 hours per month. The monthly flying and the cumulative flying done by each helicopter till 31-3-1989 in respect of both Westland and Dauphin helicopter were as under :—

Month/Year	WESTLAND				DAUPHIN			
	Hours flown	No. of helicopters	Average utilisation per month	Cumulative hours	Hours flown	No. of helicopters	Average utilisation per month	Cumulative hours
1	2	3	4	5	6	7	8	9
September, 1986	12.55	2	6.28	12.55	—	—	—	—
October, 1986	113.40	2	56.50	126.35	—	—	—	—
November, 1986	135.00	4	33.45	261.35	51.00	2	25.30	51.00
December, 1986	242.20	4	60.35	503.55	214.25	4	42.36	265.25
January, 1987	315.55	4	78.59	819.50	381.05	4	95.16	646.30
February, 1987	293.10	6	48.52	1113.00	270.55	5	54.11	917.25
March, 1987	345.35	7	49.22	1458.35	646.55	10	64.42	1564.20
April, 1987	348.35	9	38.44	1807.10	888.15	12	74.01	2452.35
May, 1987	432.30	10	43.15	2239.40	911.30	12	75.57	3364.05
June, 1987	483.10	11	43.55	2722.50	829.12	12	69.06	4193.17
July, 1987	475.40	13	36.36	3198.30	859.28	15	57.18	5052.45
August, 1987	489.20	13	37.14	3687.50	916.05	18	50.53	5968.50
September, 1987	429.40	15	28.39	4117.30	824.45	20	41.14	6793.35
October, 1987	568.35	15	37.54	4686.05	933.15	20	46.40	7726.50
November, 1987	678.20	17	39.54	5364.25	995.10	21	47.23	8722.00
December, 1987	776.49	17	45.42	6141.14	1128.25	21	53.50	9850.25
January, 1988	715.51	17	42.05	6857.05	1136.20	21	54.07	10986.45
February, 1988	666.45	19	35.05	7523.50	1167.55	21	55.37	12154.40
March, 1988	871.45	21	41.31	8395.35	1295.20	21	61.35	13450.00
April, 1988	864.40	21	41.09	9260.15	1231.50	21	58.39	14681.50
May, 1988	903.35	21	43.02	10163.50	1243.05	21	59.17	15924.55
June, 1988	846.50	21	40.19	11010.40	1215.20	21	57.52	17140.15
July, 1988	648.30	21	30.53	11659.10	1252.15	21	59.38	18392.30
August, 1988	713.12	20	35.40	12372.22	1214.35	21	57.50	19607.05
September, 1988	657.00	20	32.53	13029.22	1129.40	20	56.30	20736.45
October, 1988	605.45	20	30.17	13635.07	1223.40	20	61.10	21960.25
November, 1988	810.30	20	40.30	14445.37	1226.15	20	61.18	23186.40
December, 1988	757.05	20	37.52	15202.42	1418.15	20	70.55	24604.55
January, 1989	844.50	20	42.13	16047.32	1318.15	20	65.54	25923.10
February, 1989	621.55	20	31.05	16669.27	1171.15	20	58.35	27094.25
March 1989	745.30	19	39.15	17414.47	1379.35	20	69.00	28470.00
				Average utilisation per helicopter per month 40.13 Hours			54.86 Hours	

The average utilisation per month from the time the helicopters have been inducted into the fleet till March '89, has been only 40.13 hours in case of Westland helicopter and 54.86 hours in case of Dauphin as against the standard of 100 hours per month of flying as envisaged in the Project Report. While accepting this position, the Company has stated that the average utilisation of helicopters in terms of number of hours flown is beyond the control of Pawan Hans as utilisation is dependent on the requirement of customers. The reply of the company implies that the demand projection assessed has turned out to be

significantly higher than the actual requirement during the first 31 months of the induction of the fleet.

5.2 While the demand for the Oil Sector had been anticipated at 25 helicopters, only sixteen helicopters were required upto 1988-89 by the ONGC. Bulk of the helicopters were deployed by ONGC for their offshore drilling operations. ONGC's normal demand is 6 Westland and 10 Dauphin per day. During 1988-89 details of ONGC's contractual demand, in terms of helicopters days and flying hours and actual deployment by Pawan Hans during April, 1988 to March, 1989 were as under:—

WESTLAND						DAUPHIN					
ONGC's Contractual demand		Actual deployment		Shortfall		ONGC's Contractual demand		Actual deployment		Shortfall	
In helicopter days	In flying hours	In helicopter days	In flying hours	In helicopter days	In flying hours	In helicopter days	In flying hours	In helicopter days	In flying hours	In helicopter days	In flying hours
2190	7200	1739.5	6182	450.5	1018	3666	12046	3508.5	11781	157.5	265

From the above it may be seen that Pawan Hans was able to fulfil the demand of ONGC to the extent of 86% in case of Westland and 98 per cent in case of Dauphin in terms of flying hours. However in terms of helicopter days Pawan Hans fulfilled the requirement to the extent of 79 per cent in case of Westland and 96 per cent in case of Dauphin.

5.3 Out of total of 6 Westland and 10 Dauphin helicopters required by ONGC, a fleet mix of 5 Westland and 8 Dauphin was required daily at Bombay base. But during 1988-89, Pawan Hans was able to fulfil ONGC's contractual demand to the extent of only 72 per cent in case of Westland and 90 per cent in case of Dauphin in terms of number of days for which helicopters were required to be provided by Pawan Hans. This resulted in ONGC hiring helicopters from Indian Air Force ranging from 30 hours to 130 hours a month during 1988-89.

5.4 From the above, it would be observed that although Pawan Hans had a surplus fleet of helicopters, it was not able to meet full requirements of ONGC at Bombay.

## 6. Repairs and maintenance

6.1 Out of 21 Westland helicopters and 21 Dauphin helicopters which were put to use by 31st March, 1989 21 Westland helicopters were grounded for reportable defects for a total of 342 times for unscheduled repairs. 16 Dauphin helicopters were grounded for reportable defects for a total of 46 times for unscheduled repairs.

6.2 The frequency of occurrence of defects and the total hours logged from September/December, 1986 upto 31-3-89 are summarised below:—

WESTLAND			DAUPHIN	
Number of times grounded for defects	Number of helicopters wherein defects occurred	Total incidence of defects	Number of helicopters wherein defects occurred	Total incidence of defects
Upto 10	4	31	16	46
11 to 15	6	76	nil	nil
16 to 20	5	88	nil	nil
21 to 25	3	68	nil	nil
26 to 30	3	79	nil	nil
Total	21	342	16	46
Total fleet of helicopters	21		21	
Hours logged upto 31-3-89	17,414		28,474	
Average number of groundings per helicopter	16.3		2.9	
Frequency of occurrence of defects	51 hours		619 hours	

It may be mentioned that 6 Westland helicopters were grounded more than 20 times each for unscheduled repairs during December, 1986 to March, 1989.



6.3 Out of unscheduled repairs of Westland and Dauphin helicopters, the position in regard to premature withdrawal of engines and engines-related snags is summarised below. It may be mentioned that the engine is designed on modular concept and the various modules have different life ranging from 1800-3000 hours.

	Total incidence of defects	Incidence of premature withdrawal/failure of engine	Engine related snags	Hours logged	Engine withdrawal after every
Westland	342	65	63	17,414	268 hours
Dauphin	46	27	3	28,474	1055 hours

Out of 65 engine withdrawal cases of Westland 33 engines were sent to the manufacturers M/s. Rolls Royce, U.K. for repair and return. Out of 27 engines withdrawal cases of Dauphin helicopters, 15 engines were sent abroad to M/s. Aerospatiale, France.

6.4 It has also been observed that manufacturers have taken abnormal time for repairs and return ranging between 2 months to more than 1 year in the case of Westland engines and 4 to 12 months in the case of Dauphin engine. Brief details of time taken are as under :—

Time taken for repair and return

Type of engine	Between 1 to 3 months	Between 3 to 4 months	Between 4 to 6 months	Between 6 to 12 months	More than one year
Westland (27)	6	5	6	9	1
Dauphin (11)	2	2	4	3	—

From the above details, it could be seen that a large number of engines (15 in the case of Westland and 7 in the case of Dauphin) remained with the manufacturers for more than 4 months. It may be mentioned that in the contract with Westland the company has not made a provision that the period for which engines have remained with manufacturers for repair should be excluded from warranty period S/19 C&AG/90—5

of 18 months, with the result that the cost of repairs will have to be borne by the company once the warranty period is over. The company/Government had subsequently taken up this matter with the manufacturers and M/s. Rolls Royce has agreed in principle that period of repair will be excluded from the warranty period.

## 7. Cost of repairs & maintenance

7.1 Apart from carrying out the routine checks before every flight (which are known as first line servicing) and other minor repairs arising out of detailed inspection after fixed hours of flying (2nd line servicing), the company is not in a position to undertake structural repairs, major modification, engine overhauls and other items which are known as 3rd and 4th line maintenance and servicing. Hindustan Aeronautics Limited was asked to prepare a feasibility-cum-project report for undertaking all the overhaul activities for both helicopters. This report has since been received and is under examination by Pawan Hans Ltd. (January 1990) Ever if Hindustan Aeronautics Limited was to undertake this task, the lead time for establishing these facilities would be 3-4 years. Till such time HAL develops these facilities, the 3rd and 4th line maintenance would have to be undertaken by the manufacturers in U.K. and France and scarce foreign exchange will have to be spent.

7.2 All the helicopters are under maintenance warranty for an initial period of 18 months from their receipt in India. The cost of maintenance and repairs per flying hour was estimated as under :—

	Westland (Rs.)	Dauphin (Rs.)
Original PIB Memorandum (Feb., 86)	5901	3981
Revised cost estimates (July, 88)	11200	6300

7.3 The increase in the repair and maintenance cost of Dauphin helicopters is mainly on account of appreciation in the value of French Franc vis-a-vis the Indian rupee 62% between February, 86 and March, 88), increase in the repairs and maintenance cost of Westland helicopters is partly due to exchange fluctuations (39% increase in the value of pound sterling between February, 86 and March, 88) and partly due to hike in the rates of 3rd and 4th line maintenance by manufacturers of Westland helicopters and engine suppliers M/s. Rolls Royce.

7.4 The third and fourth line maintenance cost of Westland helicopters, which was estimated around £ 347 per hour in February 1986 had to be raised to £ 570 per hour in May, 1988 on the basis of estimates furnished by M/s. Westland and M/s. Rolls Royce. The revised cost of maintenance and repairs

for 3rd and 4th line including spares for 1st and 2nd line worked out by the company at the rates indicated by the manufacturers (February 1989) stood as under :—

	Westland	Dauphin
Including Custom Duty @ 18.45 % presently being charged from Pawan Hans	Rs. 21588	Rs. 9375

Pawan Hans is presently paying custom duty at 18.45%. They have, however, stated that they are requesting Government to reduce the duty to 3% as in case of Indian Airlines. With the reduced duty at 3% the cost of maintenance would work out to Rs. 18772 per hour for Westland and Rs. 8152 per hour for Dauphin.

### 8. Loss of Helicopters

The Company has lost three helicopters due to accidents upto March, 1989. Two of these helicopters were Westland and one Dauphin. The reasons whether these accidents were due to engine failure or human error are not yet known.

### 9. Capital Structure and Financial Results

9.1 The company was incorporated on 15th October, 1985 and registered with an authorised capital of Rs. 50 crores. As per the Articles of Association of the Company, the equity capital was to be subscribed by the President of India and ONGC in the ratio of 51:49. As on March 1989 the subscribed capital of the company was Rs. 50 crores.

9.2 When the original PIB investment proposals were made (January, 1986) it was estimated that while the company will incur a loss of Rs. 4.30 crores in the first year of its operation, i.e. 1986-87, it will start making profit from the second year of its operation (1987-88—Rs. 1.66 crores, 1988-89—Rs. 5.07 crores, 1989-90—Rs. 6.15 crores, 1990-91—Rs. 7.47 crores). In the revised cost estimates (July 1988) it was indicated that on the operations of Dauphin there will be a loss in the first five years of its operation (Rs. 3.57 crores in 1986-87 and Rs. 2.30 crores in 1990-91) and Westland in first six years of its operation (Rs. 3.55 crores in 1986-87 and Rs. 0.01 crores in 1991-92) but the two helicopters will start breaking even from the year 1991-92 and 1992-93 when Dauphin would make a profit of Rs. 0.17 lakh and Westland Rs. 0.69 lakh respectively. The revised financial internal rate of return was estimated at 4.54 per cent as against the rate of return of 16.10 per cent envisaged in the original proposal. Against the above projections in the project report, the finan-

cial results of the company upto 1987-88 and the budgeted figures for 1988-89 are as follows :—

	For the year ended (Rs. in lakhs)			
	1985-86 (Oct. to Mar.)	1986-87	1987-88 (Provi- sional)	1988-89 (Budget- ed)
<b>I. Income</b>				
Helicopter hire				
receipts	—	597.14	3,397.44	5046.74
Interest	0.14	69.01	94.92	150.00
Others	0.01	0.16	0.18	—
Total	0.15	666.31	3,492.54	5,196.74
<b>II. Expenditure</b>				
Helicopter maintenance & Operational expenses	—	391.72	1,715.31	2,137.29
Employees remuneration and other benefits	0.85	63.87	204.32	405.35
Depreciation	0.08	556.27	1,089.52	1109.41
Insurance	—	144.07	710.28	902.01
Obsolescence Reserve	—	125.36	302.24	343.58
Other (including fuel)	3.41	96.65	215.27	1,088.10
Total	4.34	1,377.94	4,236.94	5,985.74
LOSS	4.19	711.63	744.40	789.00

The final accounts of the company after the year 1986-87 as certified by the Chartered Accountants are not yet available (November, 1989).

However, the Ministry of Civil Aviation had stated (January 1990) that the main reasons for incurring losses were rather poor serviceability of helicopters, shortage of pilots and technicians and poor availability of spares from the manufacturers.

### 10. Insurance of helicopters

10.1 In June 1987 the Company evolved a scheme of Self Insurance for their helicopters with the approval of the Ministry of Civil Aviation as the Company felt that the prevalent rates for insuring hull value of helicopters were high in comparison with the rates for fixed wing aircraft.

10.2 The total funds available in Self Insurance Reserve Account were Rs. 1267 lakhs as on 31st March, 1989. However, the liability arising out of total loss of three helicopters and one major accident

suffered by the Company during September 1987 to March, 1989 was of the order of Rs. 1320 lakhs. Thus, against the reserve of Rs. 12.67 crores, losses as on 31st March, 1989 were Rs. 13.20 crores wiping out the entire reserve.

10.3 While justifying Self Insurance Scheme, the management stated (April, 1989) that the insurance premium of 4.86 per cent accounts for 23 per cent of the turnover of the Company and it was one of the main considerations which weighed in the mind of the Directors while approving the Self Insurance Scheme. The argument does not have much force as even under the Self Insurance Reserve Scheme an equivalent amount is credited to Self Insurance Reserve account and thus Company's financial liability remains the same. Further, since investment of Pawan Hans in its helicopter fleet is of the order of Rs. 163.80 crores, any scheme of insurance must give full coverage to the entire investment.

10.4 After the above lapse in Self Insurance Scheme was pointed out by Audit, the Company has informed that the Self Insurance Scheme has been modified to provide for the ground risk as well as war risk and that they have taken insurance cover from General Insurance Corporation from August, 1989 and comprehensive insurance from November, 1989.

#### 11. Shortage of trained manpower

11.1 The requirement of trained personnel and the position of their availability is given in the following

table :—

	Required for 42 helicopters	Men in position as on 31-3-89
Pilots	140	92
Engineers	73	20
Technicians/helpers	382	290

It would thus be seen that there is an acute shortage of helicopter pilots, licenced engineers and other technical staff.

11.2 Management has stated that taking into account the serviceability factor of 80%, 140 pilots are required to operate on total of 34 helicopters which roughly corresponds to a ratio of 4:1. As against this only 92 service pilots are available. The acute shortage of engineers has forced the company to obtain temporary exemption from Director General Civil Aviation for allowing its technicians (who are experienced ex-servicemen) to sign flight release certificates.

11.3 A doubt about availability of trained personnel for manning all the 48 helicopters was also raised in the PIB meeting held in March, 1986. The company had also admitted this serious constraint in its mid-term appraisal of the Seventh Plan. But for the slackness in demand for deployment of helicopters, non-availability of trained pilots would have proved a major bottleneck in the effective utilisation of these helicopters.

New Delhi

The 22 MAR 1990

Countersigned

New Delhi

The 22 MAR 1990

*K. Tyagarajan*

(K. TYAGARAJAN)

Deputy Comptroller & Auditor-General-  
cum-Chairman, Audit Board

*T. N. Chaturvedi*  
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Comptroller and Auditor-General of India

