

**PROCUREMENT OF AIR COMBAT MANEUVERING  
INSTRUMENTATION SYSTEM**

**MINISTRY OF DEFENCE**

**PUBLIC ACCOUNTS COMMITTEE  
(2018-19)**

**ONE HUNDRED AND THIRTY SEVENTH REPORT**

---

**SIXTEENTH LOK SABHA**



**LOK SABHA SECRETARIAT  
NEW DELHI**

**ONE HUNDRED AND THIRTY SEVENTH REPORT**

**PUBLIC ACCOUNTS COMMITTEE**  
**(2018-19)**

(SIXTEENTH LOK SABHA)

**PROCUREMENT OF AIR COMBAT  
MANEUVERING INSTRUMENTATION  
SYSTEM**

**MINISTRY OF DEFENCE**



*Presented to Lok Sabha on:*

*Laid in Rajya Sabha on:*

**LOK SABHA SECRETARIAT  
NEW DELHI**

**FEBRUARY, 2019/MAGHA, 1940 (SAKA)**

# CONTENTS

	PAGES
COMPOSITION OF THE PUBLIC ACCOUNTS COMMITTEE (2018-19) .....	(iii)
INTRODUCTION .....	(v)

## **PART - I**

1	Introductory	2
2	Procurement of Air Combat Maneuvering Instrumentation System	2
3	Extra Expenditure on Flight Trial Integration	7
4	Delay in Fleet Modification	24

## **PART - II**

5	Observations/Recommendations	14
---	------------------------------	----

## **<sup>1\*</sup>APPENDICES**

I	Minutes of the Fourth Sitting of the Public Accounts Committee (2018-19) held on 6 <sup>th</sup> June, 2018.
II	Minutes of the Twenty-third Sitting of the Public Accounts Committee (2018-19) held on 7 <sup>th</sup> January, 2019.

---

\* to be appended at the time of printing

**COMPOSITION OF THE PUBLIC ACCOUNTS COMMITTEE  
(2018-19)**

**Shri Mallikarjun Kharge                      -                      Chairperson**

**M E M B E R S**

**L O K   S A B H A**

2.        Shri Subhash Chandra Baheria
3.        Shri Sudip Bandyopadhyay
4.        Shri Prem Singh Chandumajra
5.        Shri Gajanan Chandrakant Kirtikar
6.        Shri Bhartruhari Mahtab
7.        Smt. Riti Pathak
8.        Dr. Ramesh Pokhriyal "Nishank"
9.        Shri Janardan Singh Sigriwal
10.       Shri Abhishek Singh
11.       Shri Gopal Shetty
12.       Dr. Kirit Somaiya
13.       Shri Anurag Singh Thakur
14.       Shri Shivkumar Chanabasappa Udasi
15.       Dr. Ponnusamy Venugopal

**R A J Y A   S A B H A**

16.      Prof. M. V. Rajeev Gowda
17.      Shri Bhubaneswar Kalita
18.      Shri Shwait Malik
19.      Shri Narayan Lal Panchariya
20.      Shri Sukhendu Sekhar Roy
21.      Shri Bhupender Yadav
22.      Shri C.M. Ramesh

**SECRETARIAT**

- |    |                       |   |                      |
|----|-----------------------|---|----------------------|
| 1. | Shri Abhijit Kumar    | - | Additional Secretary |
| 2. | Shri Sanjeev Sharma   | - | Director             |
| 3. | Shri Deepankar Kamble | - | Under Secretary      |

## **INTRODUCTION**

I, the Chairperson, Public Accounts Committee, having been authorized by the Committee, do present this One Hundred and Thirty Seventh Report (Sixteenth Lok Sabha) on **"Procurement of Air Combat Maneuvering Instrumentation System"** based on Para No. 2.3 of the C&AG's Report Nos. 34 of 2014 relating to the Ministry of Defence.

2. The above-mentioned Reports of the Comptroller and Auditor General of India were laid on the Table of the House on 19<sup>th</sup> December, 2014.

3. The Public Accounts Committee (2018-19) took up the subject for detailed examination and report. The Committee took evidence of the representatives of the Ministry of Defence (MoD), Indian Air Force (IAF) and Hindustan Aeronautics Limited (HAL) on the subject at their sitting held on 6<sup>th</sup> June, 2018. Accordingly, a draft Report was prepared and placed before the Committee for their consideration. The Committee considered and adopted this draft Report at their sitting held on 7<sup>th</sup> January, 2019. The minutes of the Sitzings are appended to the Report.

4. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in thick type and form Part- II of the Report.

5. The Committee would also like to express their thanks to the representatives of the Ministry of Defence (MoD), Indian Air Force (IAF) and Hindustan Aeronautics Limited (HAL) for tendering evidence before them and furnishing the requisite information to the Committee in connection with the examination of the subject.

6. The Committee place on record their appreciation of the assistance rendered to them in the matter by the Office of the Comptroller and Auditor General of India and the Committee Secretariat in preparation of the Report.

**NEW DELHI;**  
**7 January, 2019**  
**2 Pausha, 1941 (*Saka*)**

**MALLIKARJUN KHARGE**  
**Chairperson,**  
**Public Accounts Committee.**

## **REPORT PART - I**

### **I. INTRODUCTORY**

1. The Committee selected Para No. 2.3 relating to "Procurement of Air Combat Maneuvering Instrumentation System" based on the C&AG's Report No. 34 of 2014 relating to Indian Air Force (IAF) and the Ministry of Defence (MoD) for detailed examination and report.

2. Against this backdrop, the Public Accounts Committee (2018-19) obtained background note, requisite replies and sought clarifications from the MoD and IAF. The Committee took oral evidence of the representatives of the MoD and IAF on both the para on 06.06.2018 and consequently obtained information on the subject. Based on the information gathered, the Committee proceeded with examination of the relevant issues in detail as outlined in the succeeding paragraphs.

#### ***Para No. 2.3: Procurement of Air Combat Maneuvering Instrumentation System (ACMI)***

3. The Committee found that Air Combat Maneuvering Instrumentation (ACMI) system provides an electronic replay of the entire combat sorties ensuring thorough effective post-flight debriefings, resulting in improvement of the air combat skills of pilots with lesser flying effort thereby directly contributing to operational skills. It also has the facility to monitor the combat parameters, in real time, at a ground station with an option to communicate immediate warning of unsafe/collision regimes, thus contributing to flight safety. The system comprises of Static and Ground Mobile Station, External pods, Network terminals and Very/High Ultra Frequency Receive/Transmit (V/UHF R/T) sets.

4. On the query of the Committee, the Ministry, while explaining the necessity for procuring ACMI system to the Committee, furnished as under:

"During air combat training sorties, multiple aircraft manoeuvre in three dimensions with fast changing positions along all three axes. For debriefing, the recap is done manually with aircrew recapitulating the air situation after the mission. This is very time consuming and at times not very accurate because of human limitations. These limitations resulted in more flying effort required to attain the desired proficiency level by the pilot. For better assimilation of combat training missions and to economise on flying effort, the training system capable

of electronically recording and replaying the air combat manoeuvres in real time at a central location and its post-flight analysis was envisaged by IAF. Similar training systems are followed by the best of the Air Forces for training their aircrew. "

5. Giving background of the ACMI system, the Ministry informed the Committee as under:

"Air Combat Manoeuvring Instrumentation System (ACMI) provides an in-depth electronic replay of combat sorties for all aircraft that are integrated with ACMI system. The central ground station is used to monitor aircraft parameters with the feature to communicate with the fighter aircraft for advising it of any unsafe flight conditions such as collision or exceedances. Similar training systems are followed by the best of Air Forces for training their aircrew.

Air Combat Manoeuvring Instrumentation System (ACMI) consists of the following two major components:-

- (a) Airborne Instrumentation System (AIS pod)/ACMI Pod:

This is a single pod which is externally mounted on the aircraft. The pod contains position and time sensors (GPS/IMU), data-link with Dynamic Allocation of Time Slots (DATS), Removable Data Storage (RDS) and powerful Central Processing Unit. The pod interfaces with aircraft systems and records the aircraft data for its transmission to the ground station.

- (b) Ground Exploitation (Debriefing) Station (GES):

It is used to define pre-flight mission specific parameters, real-time monitoring of combat missions and post-flight analysis and debriefing. A Real Time Tracking Position (RTTP) system is part of the GES which allows real-time tracking of the aircraft with ACMI pod."

6. The Ministry highlighting the advantages of ACMI system over conventional training, intimated as under:

" The ACMI system provides following advantages:-

- (a) Cost effective real-time training.
- (b) Effective debriefing.
- (c) High fidelity weapon and EW threats simulation.
- (d) Real time weapon hit/miss assessments.
- (e) Enhanced safety during air-combat exercises.

To provide more effective training to its aircrew and economise the flying effort, Indian Air Force procured Air Combat Manoeuvring Instrumentation (ACMI) Systems. "

7. The Vice Chief of IAF, during oral evidence, while explaining the procedure before induction of ACMI system, submitted as under:

"I have been to that air base, which is our fountain head of all knowledge related to air combat situations. A question was asked how we used to do it earlier. Earlier, we had the ability to recap, whatever happened in a sortie, we had to come; we had to write down; we had to make diagrams on floppies and then we had to listen to the tape-recorded sortie hauls and then the debrief was conducted. This debrief for a typical sortie where eight aircraft are fighting together used to take at times eight hours."

8. The Committee desired to know as to what was the practice/mechanism in IAF to get post flight debriefings from fighter pilots before induction of ACMI system. In this regard, the Ministry in their written reply, stated as under:

"Prior to induction of the first ACMI system in Apr 98, post flight debriefs were based on the ability of pilots to recall their manoeuvring in the air and the relative position of other aircraft in time and space. This resulted in differing perspective on the sequence of events and was not the best method of debriefing. This also resulted in ambiguities and errors that creep in because of the human memory."

9. During their examination, the Committee found that the MoD, in October 2007, concluded a contract with M/s BVR System Ltd., Israel, an original equipment manufacturer (OEM), for procurement of three ACMI systems inclusive of 46 external pods and associated equipment at a total cost of 19.46 million US\$ or ₹ 79.57 crore. These systems were delivered between December 2009 and January 2010 and commissioned between April 2011 and September 2011 at three Air Force Stations (AFS), 'M', 'N' and 'O'. The IAF procured two additional ACMI systems inclusive of 54 pods along with associated equipment at a total cost of 18 million US\$ or ₹ 87.56 crore in December 2010 under option clause of the main contract. These were delivered during July-August 2012 and installed in July 2013 at AFS 'P' and 'Q'.

10. The Committee sought to know the details of ACMI contract. The Ministry in their Background Note, submitted to the Committee, stated as under:

"Air Combat Manoeuvring Instrumentation System (ACMI) was procured from M/s BVR of Israel in two stages where in a total of 100 ACMI pods, five static ground stations and three mobile ground stations were procured at a total cost of Rs. 167 crore. The contracts were signed on 29.10.2007 and on 14.12.2010 respectively."



11. During oral evidence, the Vice Chief of IAF, apprised the Committee about the contract details by submitting as under:

"In terms of contractual issues, this is a multi-vendor contract. Out of this multi-vendor contract, four companies qualified. Out of the four companies that passed the FPT, one company that quoted the lowest was the company that was selected. So, I would like to suggest that any time you integrate a system that is coming from a different company on an aircraft that has come from France, on an aircraft that has come from Russia, on an aircraft that has come from England and on our own LCA subsequently like what we are doing, it is a difficult task. It is a difficult technical task but the efforts that we have put in, have helped us. It reaped the benefits of the money that was invested into the system. Nothing has gone waste. This is what I would like to suggest."

12. The Committee sought to know the reasons for delay of more than one year in commissioning of ACMI system at respective AFSs. In this regard, the Ministry clarified that the commissioning of the Ground Stations of the ACMI system was linked to the successful integration of the ACMI pods on the initial three aircrafts.

13. The Committee desired to know the reasons of procuring the ACMI system from M/s BVR System Ltd., Israel. The Ministry, in their written reply, furnished as under:

"The criteria of selection of L1 vendor for procurement of ACMI system was followed as per the procedure mentioned in the DPP-2005. RFP for ACMI system was issued to nine vendors on 10 Nov 2005. Following four vendors submitted their Techno-commercial Proposal in response to RFP:-

(a) M/s BVR, Israel

(b) M/s RADA, Israel

(c) M/s Cubic Defence, USA

(d) M/s Prescient System & Technologies, Singapore

Out of these four vendors, M/s RADA, Israel was rejected at TEC (Technical Evaluation Committee) stage and M/s Prescient System & Technologies, Singapore was rejected at Field Evaluation stage. Commercial proposal of two vendors i.e M/s BVR, Israel and M/s Cubic Defence, USA were opened by the CNC and M/s BVR, Israel was found to be the L1 vendor."

14. Further, the Committee wanted to know whether the Transfer of Technology (ToT) clause was included while signing the contract with the OEM. The Ministry, in their written reply, informed the Committee as under:

"No, it was not included while signing the contract with OEM as the same was not envisaged in the RFP. The procurement was for a limited number (46 pods + 3 Ground stations in the first contract followed by procurement of 56 pods + 2 Ground stations under option clause) and hence ToT was not envisaged."

15. The Committee also sought to know whether the Ministry had taken/proposed any steps towards the indigenous manufacture of the ACMI system. The Ministry replied in the negative and through their written reply, further apprised the Committee as under:

"No, indigenous manufacture of ACMI pods is not planned as the availability of 100 ACMI Pods is adequate for the current training requirements of IAF. These pods have been made universal i.e it can be exploited on all the platforms modified for its carriage."

16. The Vice Chief of IAF, during oral evidence, apprised the Committee about the safety features of the ACMI system by stating as under:

"....Also, I am happy to report that we have not had any accident during combat after this pod has been inducted because it is very easy to understand quickly. What took a long time to understand about combat, we understand quickly, thanks to the system."

17. The Committee further desired to be apprised about the reduction in number of collisions between aircrafts during routine/training sorties and also the long term benefits accrued to the IAF. In this regard, the Ministry, through their written reply, submitted as under:

"The objective of ACMI pods is to enhance the training value for the aircrew. However indirect contribution to the flight safety in preventing mid- air collision was achieved by enhancing the air combat skills of the pilots. It also contributes to flight safety by providing an audio warning to the aircrew whenever the aircraft parameters or flight path is likely to violate the laid down restrictions. Thus significant long term benefits of ACMI pods in enhancing flight safety and training values was accrued to IAF. The induction of ACMI has led to a complete change in the mechanism of post flight debriefings. The ACMI pod fitted on the ac constantly transmits ac flight path information to the ground station. On ground, when replayed along with the inputs from many other pods, it reproduces an accurate and a comprehensive picture of the air combat. Wrong inferences can lead to poor tactics and these are avoided. This helps to eliminate the ambiguities and errors that creep in because of the human memory. Thus the ACMI has helped multiply the combat training value manifold. Real time monitoring of a combat air situation is also possible by the ground-based supervisors. If required, corrective instructions are passed on Radio thus

resulting in better assimilation of an air situation and enhancing flight safety. Tactics development is enhanced with the assistance of ACMI records."

#### **I. Extra Expenditure on Flight Integration Trial**

18. The Committee found that the ACMI pod fitted on the aircraft constantly transmits aircraft flight path information to the ground station. At the ground stations, it reproduces an accurate and a complete picture of the air combat when replayed along with the inputs from many other pods. These 100 pods were to be adapted to the six different aircrafts through placement of Repair, Manufacture and Supply Orders (RMSO) on Hindustan Aeronautics Limited (HAL). Out of the six aircrafts, integration of system on aircraft 'C' was to be carried out during their upgradation programme by 2020 by the OEM. For the remaining five aircrafts, flight test of these pods was prescribed at the rate of three days per aircraft i.e. a total of 15 days for five aircrafts. These test flights were referred to as "Transparent Flights" and were planned and debriefed by the seller.

19. The Committee further found that these flight tests were to be completed in two phases i.e. in first phase, Integration Flight Test (IFT) inclusive of Pod Integration Trials (PIT) was to be carried out in 15 days for all the five variants of aircraft to refine interface control document between pod and the aircraft. In second phase, On Site Acceptance Test (OSAT) was to be carried out to check the performance of the pod and the entire ACMI system for which no time line was prescribed in the contract.

20. The Ministry, in their Background Note, furnished to the Committee, apprised them about the ACMI Integration Plan by stating as under:

" The ACMI system (ACMI pod) was not an Original Equipment Manufacturer (OEM) fitted system and was required to be integrated as a new system on the IAF aircraft.

ACMI pods were required to be integrated on six different airborne platforms (aircraft) with their respective avionics systems. The platforms earmarked for integration of ACMI in avionics mode were Su-30, Mig-21Bison, Jaguar DARIN I and II, MiG-27 Upgrade, Mirage-2000 and MiG-29 Upgrade. After the finalisation of integration scheme during design stages, the trial integrations were planned on these aircraft. After successful completion of trial modification and flight evaluation of the integrated system, the series/fleet modifications were to be undertaken by IAF through Hindustan Aeronautics Limited (HAL) by placing Repair, Manufacture and Supply Order (RMSO). The responsibility of aircraft

modification i.e. structural modification, avionics system modifications was that of IAF, which was to be executed through HAL/OEM.

The seller was required to modify and update the ACMI pod hardware and software towards integration on the designated aircraft. Integration of ACMI on five aircraft viz. Su-30, Mig-21Bison, Jaguar, MiG-27 and Mirage-2000 was to commence in the existing configuration (Standard of Preparation) of the aircraft and integration on MiG-29 Upgrade was to be carried out during its upgrade by OEM i.e. RAC MIG."

21. The Committee note that as per the contract, IAF carried out Pre Despatch Inspection (PDI) of the equipment at seller's premises, in order to check their compliance with specifications in accordance with its usual standard procedures. However, the Committee observed that from the flight integration trial report that when the vendor brought the equipment to India for first phase of flight trials, it could not integrate the pods successfully with various aircraft at IAF bases due to software problems. As a result, IAF had to fly 5 fighter aircraft in seven phases from 15 December 2009 to 5 March 2011 for validation of Pod Integration Trials (PIT). The vendor could not clear PIT within stipulated time i.e 15 days @ 3 days per aircraft. Instead, the vendor had taken 43 days for PIT i.e. 28 days in excess of the prescribed time in which 84 additional sorties were undertaken for the clearance of flight integration trials. Although contract provision stipulated a total of 15 days for five aircraft for flight tests. Also, no provision for recovery from vendor on account of excess flight trials was provided therein and consequently, IAF had to bear an extra expenditure of ₹ 10.35 crore on account of these 84 excess sorties towards PIT.

22. Explaining the process of integration of ACMI system to the Committee, the Ministry, in their Background Note, furnished as under:

"New pod integration process involves aero-mechanical, electrical and software integration stages.

(a) The aero-mechanical integration is carried out to ensure that the pod interfaces (connects) with aircraft structure satisfactorily without mechanical and aerodynamic interference. The aero-mechanical integration trial, also referred as Pod Integration Test/Trials (PIT), allows the new store to be carried on the aircraft.

(b) For operational utilisation, the electrical integration is required to ensure that the electrical power and signals are interconnected satisfactorily between aircraft and ACMI pod.

(c) The software integration of the ACMI pod ensures that the pod obtains requisite aircraft data and pilot selections of weapon switches / buttons / trigger

from aircraft avionics system for its processing and transmission to Ground Exploitation System (GES).

The PIT enables carriage of the pod while exploitation of pod functionality is possible only after successful completion of the electrical and software integration trials.

The software integration with aircraft is a complex and iterative process, as single unified software of the ACMI pod is required to interface with different types of aircraft avionics system software. Additionally, the host aircraft are designed and manufactured by different OEMs from different countries. Hence, availability of information of avionics system software is limited which leads to additional effort to integrate the ACMI software. The responsibility of modification of software of the ACMI pod rests with the OEM of the ACMI pod while IAF is responsible for the modification on the software of aircraft system side. "

23. Clarifying the position, the Vice Chief of IAF, submitted as under:

"....Insofar as the Air Combat Manoeuvring Instrumentation is concerned, I want to clarify that PIT, Pod Integration Test, was done within three days. The manufacturer of this pod is not manufacturer of the aircraft. He is not assuring you in any way how the aircraft will behave after the pod has been fitted on the aircraft. He has no access to confidential data of this aircraft and its behaviour, particularly in combat situations. It is the responsibility of the Air Force. What the manufacturer responsible for is that once the pod is kept on the aircraft's wing and the pylon, all on the ground, the two interfaces, the interface document that was given to him and the interface document that was given by him, are matching with each other. This is what he is supposed to be responsible for.

24. Supplementing the above, he further submitted:

"Thereafter, once this pod is integrated in this manner on the ground, then we carry out flight trial. With specific to the pod, whatever is the speed that the pod is supposed to go, whatever is the data link capability of the pod, those things are met. Once those things are done, then using that pod on the aircraft in a combat situation by taking the aircraft to edge of its envelope and seeing that because of the pod the aircraft's handling does not get compromised which is a part of the trial, is what takes time.

25. In this regard, the witness further stated as under:

"We are unable to give all these data to the manufacturer of the pod for the one reason which is security. Supposing Su-30's data of what happens up higher angle of attack, what the Su-30 can do—if this information is given to Israel, we will be held accountable. So, it is our task and that is what takes time. No manufacturer will give a time because he knows that LD will be imposed on him. He will give a time that is reasonable. So, this three-days' time per aircraft is reasonable to check the ICDs and to check pod integration trials on the aircraft. But subsequently, what is being misunderstood is that aircraft's performance trial with this pod opening of the envelope of the aircraft, has to take time and that is

what has happened. So, this is what we attempted to explain in our presentation. Perhaps, we are not as articulate as we should have been. But I hope this puts to rest the issue of what is a pod integration trial and what is clearance eventually for pod to fly on the aircraft operationally. That is one issue."

26. The Committee sought to know the total number of air bases/aircraft on which ACMI system was envisaged to be installed and also sought to know the number of aircrafts it was successfully installed. The Ministry through a written reply informed as under:

"The project included three static debriefing stations and that were planned to set up at three Air Force Stations located at Jodhpur, Adampur and Kalaikunda as per the original contract.

As per the additional Contract under Option clause, two Static stations were planned to be set up at Air Force Stations Pune and Gwalior.

As per the contract, only the type of aircraft to be modified for carriage of ACMI pod was specified. Total number of aircraft to be modified is on required basis to exploit the available pods.

ACMI pods were required to be integrated on six different airborne platforms (aircraft) with their respective avionics systems. The platforms earmarked for integration of ACMI in avionics mode were Su-30, Mig-21 Bison, Jaguar, MiG-27 Upgrade, Mirage-2000 and MiG-29 Upgrade.

The number of aircraft in which ACMI system has been successfully installed as on date are as follows:-

S No.	Type of Aircraft	Number of aircraft modified
1.	Su-30 MKI	209
2.	Mig 27 UPG	38
3.	Jaguar D-II	12
4.	Mig 21 (BISON)	65
5.	Mig 29 UPG	24
6.	Mirage 2000	15
7.	<b>Total</b>	<b>363</b>

27. The Committee specifically wanted to know whether the vendor could clear PIT within the stipulated time i.e. 15 days viz. 3 aircraft per day according to the contract and also wanted to know as to what action was taken by the IAF against the vendor who took 43 days for PIT. The Committee note that on the matter regarding excess flight trials/sorties, the Ministry stated that the total 138 flights/sorties i.e. 109 sorties for PIT and 29 sorties for OSAT were undertaken and were silent on the 84 excess sorties undertaken in extra 28 days for pod integration trials and the expenditure incurred thereon. The Ministry further stated that the extra expenditure worked out towards PIT was not completely incurred towards PIT but also included comprehensive flight evaluation through flight integration trials. They also further added that PIT tests were carried out during flight evaluation trials within the prescribed period as per contract.

28. The Committee found that all flight trials were conducted to integrate the ACMI pod for which the vendor had taken 43 days to clear the flight trials as against the stipulated 15 days for PIT. As a result, IAF had to incur an extra expenditure of ₹ 10.35 crore on extra sorties undertaken during the 28 days for PIT of the system besides the flight test efforts for OSAT were carried out in addition to the pod integration test.

## **II. Delay in Fleet Modification**

29. The Committee noticed that, in April 2014, out of six variants of aircraft, IAF had placed Repair, Manufacture and Supply Orders (RMSO) on Hindustan Aeronautics Limited (HAL) for series modification in respect of only three variants of aircrafts between April-November 2011. For the remaining three variants, the RMSO for 15 'A' aircrafts was concluded in April 2014 and balance 30 'A' aircrafts were to be modified after their up-gradation in 2020-21. The RMSO for 'B' aircrafts was to be placed and in respect of 'C' aircrafts, no separate RMSO had been placed as all 'C' aircrafts would be upgraded by aircraft OEM in which ACMI integration was a part of Final Operational Clearance.

30. The Committee further observed that the shelf life of ACMI system is 20 years from the date of delivery and till July 2014, series modification of only one variant of aircraft 'D' had been fully completed whereas the fleet of aircraft 'E' and 'F' had been

partially modified. Considering the up-gradation plan of aircraft 'A' and 'C', which were under their various phases, the complete fleet modification of all the variants of aircraft for integration of ACMI system would not be accomplished till the end of 2020-21. Thus, half of the shelf life of these ACMI system since delivery would expire.

31. The Ministry, in their Background Note, furnished to the Committee, explained to the Committee about the shelf life of ACMI system by stating as under:

"It is reiterated that ACMI being electronics system in a mechanical enclosure has life based on condition basis. The OEM has confirmed that the service life of the equipment shall be at least 20 years from the date of delivery. The series modification of the IAF aircraft is a continuous process and presently 363 aircraft are modified to use 100 ACMI pods. Therefore presently for every three modified aircraft there is at least one ACMI pod available. All the ACMI pods are being used by the modified aircraft and the system is being fully exploited for its intended purpose. Where Fleet Modification is in progress, the training is being imparted through conventional methods."

32. The Committee sought to know the reasons for placing RMSO on HAL for only three variants from its aircraft fleet. The Ministry, through a written reply, submitted as under:

"IAF placed an initial RMSO on HAL for Su-30, Mig-21 Bison and Mig-27 Upgrade.

The RMSO of the Jaguar aircraft could be placed only after getting the clearance of carriage of R-73 pod on the aircraft after successful completion of flight evaluation trials on the aircraft. This delay was anticipated at the time of signing of the contract and was annotated in the contract in the form of Note- *"Flight testing of the ACMI pod on the Jaguar aircraft shall be carried out after IAF obtains clearance and certification for R-73 carriage on the Jaguar aircraft, which will be no later than 19 months after ARA of this contract."*

It was clearly mentioned in the contract that for ACMI integration on Mirage aircraft *"May be installed if possible, in avionics mode, following the aircraft survey by SELLER"*. This was due to non-availability of aircraft information with IAF.

The ACMI adaptation on Mig-29 aircraft was linked to the upgrade programme and hence no RMSO was placed with M/s HAL."

33. The Committee wanted to be further apprised of the delay in fleet modification in the aircraft for ACMI integration, the Ministry, in their written submission, furnished to the Committee, submitted as under:



"The OEM has confirmed that the service life of the equipment shall not be limited to 20 years and be at least 20 years from the date of delivery. ACMI being an electronics system in a mechanical enclosure, has life based on condition basis and hence can be exploited well past the limit of 20 years. The experience of Indian Air Force of life extension on all the earlier inducted systems like Chetak/Chetah, Avro, THD-1955 etc. indicates that life extension of ACMI can be ensured. Additionally, the contracts specifies that the seller has to give at least two year notice to the buyer before closing the production line so as to enable the buyer to buy life time supply of spares.

The modification of Mirage 2000 and MiG 29 aircraft was linked to the respective upgrade programme and delays in these programmes affected the timelines in ACMI integration. However the training standards in these fleets were not affected due to this delay. It is reiterated that the ACMI pod is now a universal pod and can be utilised on any ACMI modified aircraft. There is no expired equipment in this regard.

The series modification of remaining aircraft is being under taken in phased manner. 363 ACMI modified aircraft are presently available for using the 100 ACMI pod for training. Therefore, for every 03 modified aircraft there is at least one ACMI pod available. All the ACMI pods are being used by the modified aircraft and the system is being fully exploited for its intended purpose."

34. During the course of the examination of the subject, the Committee found that due to non synchronization of fleet modification plan with the procurement and integration of ACMI system with all the variants of platforms, the system procured at the total cost of ₹167 crore could not be exploited fully for training of pilots. Further, by the time all the system would be integrated, half of the shelf life of the pods would expire since delivery.

\*\*\*\*\*

## **PART-II OBSERVATIONS AND RECOMMENDATIONS**

After gleaning through all the documents and information submitted to the Committee and during the course of examination of the current subject, the Committee find that Indian Air Force had incurred an extra expenditure to the tune of Rs. 10.35 crore on account of excess flight trials. These flight trials were undertaken for integration of Air Combat Maneuvering Instrumentation System (ACMI) with the existing fleet of Indian Air Force. They find due to non synchronization of fleet modification plan with the procurement and integration of ACMI system with all the variants of platforms, the system procured at the total cost of Rs. 167 crore could not be exploited fully for training of pilots. The Committee further observe that by the time all the system would be integrated, half of the shelf life of the pods would expire since delivery. The observations and recommendations of the Committee are brought out in the succeeding paragraphs.

2. The Committee note that the ACMI system provides an electronic replay of the entire combat sorties ensuring post-flight debriefings, improvement of the air combat and operational skills of pilots. It also monitors the combat parameters in real time at a ground station with an option to communicate immediate warning of unsafe/collision regimes contributing to flight safety. The system comprises of Static and Ground Mobile Station, External pods, Network terminals and Very/Ultra High Frequency Receive/Transmit (V/UHF R/T) sets. The ACMI pod fitted on the aircraft constantly transmits aircraft flight path information to the ground stations and reproduces an accurate and a complete picture of the air combat when replayed along with the inputs from many other pods to the aircrafts.

3. The Committee note that ACMI system, which is being integrated in the IAF, is an advanced aircraft maneuvering system, the technology of which is available only with a few manufactures in the world. This system was purchased from M/s. BVR System Limited, Israel, which is the Original Equipment Manufacturer (OEM) and stood as L-1 vendor for procurement of the system. However, the Committee

find that there existed several shortcomings right from the stage of signing of the contract with the OEM. In the first instance, the Committee fail to understand as to why the Transfer of Technology (ToT) was not included while signing the Contract. The Committee in this regard are not convinced with the assertion of the Ministry that ToT was not included in the Contract as the same was not envisaged in the Request For Proposal (RFP). Again the Committee cannot understand that why it was not envisaged in the RFP. In their opinion, a number of 102 pods and 5 ground stations costing Rs. 167 crore is neither a small number nor a frivolous amount and ToT would definitely help the IAF in the long run in not only in maintaining the system but also giving self-sufficiency towards the indigenous manufacture of the system if need be. The Committee would like to be apprised of the circumstances which lead to non-inclusion of ToT in the Contracts.

4. The Committee learn that Integration Flight Test (IFT) inclusive of the Pod Integration Trials (PIT) were stipulated to be cleared within 15 days with three days having allotted for a single aircraft. Against this stipulated time-frame, the Committee note with concern that the vendor took as long as 43 days for PIT, i.e., 28 days in excess of the timeframe. Due to this reason, 84 additional sorties had to be undertaken for the clearance of IFT, which resulted in an extra expenditure of Rs. 10.35 crore. In this case, it is evident that onus of successful and timely integration of the pods on the aircraft lay with IAF. The Committee caution the IAF that in future, they should undertake due diligence much in advance so that instances of this nature could be avoided.

5. Another example of lack of planning and foresight on the part of the Ministry as well as IAF has come before the Committee. They have been informed that one of the reasons for time and cost overrun was the software compatibility being faced during PIT due to the fact that fleet in the IAF were manufactured by different OEMs from different countries. In its own admission, the Ministry had stated that the responsibility of modification of software of the ACMI pod rested with the OEM of the ACMI pod while IAF was responsible for the modification on the software of aircraft system side. The Committee are contented with the

viewpoint of the IAF that the sensitive information about the planes could not be provided to the OEM of ACMI, nevertheless they feel that had the Ministry/IAF brooded upon the issues seriously, this problem could have been avoided. At the very stage of the inception of this Project, IAF should have envisaged that there might occur some difficulties in the integration of pods as their aircrafts come from different manufacturers. It is needless to mention that efforts be made to devise a sound mechanism for effectively and timely integrating such sensitive systems with the IAF Fleet and to obviate recurrence of such instances in future.

6. One more disconcerting aspect which has come before the Committee is the delay in fleet modification which has a direct bearing on the shelf life of the ACMI system. The Committee note that the shelf life of ACMI system is 20 years from the date of delivery and that series modification of only one variant of aircraft 'D' had been fully completed. As regards the fleet of aircraft 'E' and 'F', it has been stated by the Ministry/IAF that they have been partially modified. They further note that the complete fleet modification of all the variants of aircraft fleet of IAF for integration of ACMI system would not be accomplished till the end of 2020-21. From these facts, the Committee are concerned view that by the time the entire fleet of IAF gets modified, half of the shelf life of the ACMI system would have expired thereby defeating the optimal operational exploitation of the system during its life time. The Ministry/IAF, on the one hand, have asserted that the system would still be functional and operational beyond its shelf life and, on the other hand, the Ministry, in the Background Note furnished to the Committee, have stated that the system's life is conditional. The Committee do not concur with the assertion of the Ministry in this regard and wonder whether IAF's fleet modified to integrate with the ACMI system would be relevant in the present day scenario. This contradiction in the stand of the Ministry once again highlights lack of proper planning and foresight on behalf of the Ministry/IAF. The Committee, therefore, recommend that the Ministry/IAF should look into the entire issue and come out with the reasons as to why the modernization of the fleet was delayed with subsequent cost escalation. They also recommend that the Ministry/IAF should revisit and constitute firm guidelines for acquiring and

commissioning any hardware/technology in future and do proper home work. They further recommend that all upgradation jobs be completed with the minimum delay in a cost-effective manner.

\*\*\*\*\*

NEW DELHI;  
7 January, 2019  
2 Pausha, 1941 (*Saka*)

MALLIKARJUN KHARGE  
Chairperson,  
Public Accounts Committee.