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Report of the
Comptroller and Auditor General of India

on

Working of Army Base Workshops

Union Government
(Defence Services - Army)
Report No. 36 of 2016
(Performance Audit)

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for the year ended March 2016

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PREFACE

The Army Base Workshops carry out repairs and overhaul of weapons, vehicles and equipment to keep the Indian Army operationally ready. There are eight Army Base Workshops (ABWs), of which five ABWs viz 505 ABW, Delhi; 509 ABW, Agra; 510 ABW, Meerut; 512 ABW, Kirkee and 515 ABW, Bengaluru were selected for Performance Audit.

Performance Audit of "Working of Army Base Workshops" was conducted during July 2015 to December 2015 to assess the effectiveness of the workshops with regard to timeliness of overhaul, adequacy of infrastructure, timely availability of spares and quality of the repairs. By highlighting the systemic deficiencies and recommending remedial measures, the report seeks to bring about overall improvements in the functioning of ABWs.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India and the report has been prepared for submission to the President under Article 151 of the Constitution of India.

Executive Summary

1. Why did we do this Performance Audit?

Review of Army Base Workshops was commented in Comptroller & Auditor General (C&AG)'s Audit Report No. 14 of 1992 and Para No. 3.1 of Audit Report No. 6 of 2005. The important issues highlighted in the reports included progressive up-gradation of the Workshops, non-exploitation of available capacities to the full extent due to non-availability of repairable, poor backup of spares and non-observance of cost accounting system.

This Performance Audit of "Working of Army Base Workshops" was taken up to assess the effectiveness of the workshops with regard to timeliness of overhaul, adequacy of infrastructure for overhaul, timely availability of spares and quality of the repairs. The Performance Audit also looked into the status of assurances given in the Action Taken Notes on earlier reviews.

2. Key Findings:

There are eight Army Base Workshops, of which seven are responsible for repair and overhaul of equipment/ weapons and one workshop has been tasked with the responsibility of indigenisation and manufacture of spares. The Performance Audit covered a period of six years from 2010-11 to 2015-16. Five out of eight Army Base Workshops (ABW) *viz.* 505 ABW New Delhi, 509 ABW Agra, 510 ABW Meerut, 512 ABW Kirkee based on the criticality of the equipment to the Indian Army and 515 ABW Bengaluru being the only spares manufacturing workshop were selected for audit.

Backlog in overhaul of fighting equipment

The Indian Army has a large inventory of weapon systems and equipment which need to be maintained and sustained in battle worthy condition. The periodicity of overhauling an equipment is based on the maintenance philosophy promulgated at the time of induction for the envisaged life cycle.

- In case of Tank T-72, the quantum of backlog of overhaul has been significantly reduced from 713 at the end of 2010-11 to 479 at the end of 2015-16 which constitutes around 20 *per cent* of total holding.
- In case of BMP-II and BMP-IIK tanks and also in case of Armoured Recovery Vehicle *viz* ARV WZT-2 the backlog of overhaul has declined during this period though in a muted manner. 802 BMPs constituting around 33 *per cent* of total holding and 200 ARV WZT-2 constituting 90 *per cent* of total holding were due for overhaul, reducing the effective availability of the fleet for the operations to that extent.

(Paragraph 2.3)

Backlog in overhaul of signal equipment

We observed backlog in first overhaul of 18 *per cent* of Radar Fly Catcher, 34 *per cent* of Radar TC Reporter and 21 *per cent* of Battle Field Surveillance Radar. Backlog of 25 *per cent* was noticed in second overhaul of Radar Fly Catcher.

(Paragraph 2.3.1)

Non Formulation of overhaul policy for Class 'B' vehicles-Scania, Tatra and Kraz

No overhaul policy for Scania, Kraz-255 B/B1 and Tatra T-815 was available with HQ Base Workshop Group (BWG) and the concerned workshops. Presently, Base workshops are accepting these vehicles of eight years vintage and above for overhaul as per the direction of EME Directorate.

(Paragraph 2.7.1)

Lack of facilities for repair/ overhaul of MBT Arjun

124 numbers of Main Battle Tank (MBT) Arjun were inducted into the Army from 2004-05 onwards. The Tank is due for overhaul from 2020-21. At the time of induction, 69 *per cent* components were imported**.** The two agencies *viz* Combat Vehicle Research Development Establishment (CVRDE) and Heavy Vehicle Factory (HVF) were responsible for providing the components required to sustain the fleet during its life cycle through indigenization or import. However, owing to the failure of CVRDE in indigenizing the required components, HVF could not supply any spares. In the absence of spare support, MBT Arjun was not being operational since 2013.

(Paragraph 3.2.4)

Extent of achievement of overhaul targets by ABWs

- At 505 ABW, overhaul in respect of Tank T-72, during the period from 2010-11 to 2015-16 ranged between 60 to 83 *per cent* of original targets excepting 2011-12 when 10 Tanks were overhauled against a target of 50. In respect of Engines of T-72 also, except 2011-12 which was a bad year as only seven engines were overhauled against original target of 100, the achievement during other years ranged from 30 (60 *per cent*) to impressive 100 (100 *per cent* during 2015-16) overhauls. Although the backlog of Tank T-72 for overhauling is 479 during 2015-16, however, it has also come down from 713 in 2010-11.

- At 512 ABW, there was shortfall in achieving the targets *vis a vis* original targets in respect of BMP ranging from 13 to 62 *per cent*; there was relatively better performance during 2013-14 and 2014-15 as the number of BMPs overhauled was 104 (more than 85 *per cent* of target) and 106 (around 70 *per cent* of target) during these two years respectively. In respect of ARV WZT-2, achievement was only 22 against the target of 222. It was only during 2015-16 that the achievement was in a two digit figure (13) while in earlier years the achievement ranged from 0 to 03 against target ranging from 02 to 10. In respect of UTD-20 engines, achievement of overhaul target was relatively better as overall achievement during 2010-11 to 2015-16 was above 77 *per cent* of the original targets.

- At 509 ABW, there were shortfalls in achieving the targets *vis a vis* original targets up to 50 *per cent* in respect of Radar Fly Catcher and up to 60 *per cent* in respect of Radar TC Reporter. In respect of Gen Set 30 KVA, shortfall against original targets during 2010-11 to 2015-16 ranged from nil (2010-11) to 62 *per cent* during 2014-15. In case of Battle Field Surveillance Radar (Medium Range), there was marginal shortfall during 2011-13.

- 510 ABW undertakes overhaul of various engineering equipment and specialist vehicles. 510 ABW had generally turned out respectable performance except that its achievement in respect of overhaul of Heavy Recovery Vehicle viz HRV AV15 during 2014-15 was merely 10 *per cent* of the original targets. There was all round commendable performance during 2015-16.

(Paragraph 2.4.1, 2.5.1, 2.6, 2.7)

Inordinate delay in overhaul

Against the norm of 153 days, overhaul of BMPs was inordinately delayed and the ABW took up to 1512 days for the overhauls. Similarly, for Tanks T-72, the delay ranged up to 836 days against the norm of 144 days. The average time taken for overhaul of each UTD-20 engine for BMP was 308 days which was 10 times of the stipulated time frame of 30 days. Overhaul of Radar and its variants also experienced delays up to 921 days.

(Paragraph 2.4.2,2.5.2, 2.6.1)

Low Quality Index for overhaul of BMPs

Quality Index (QI) for overhauled BMP should be 95. We observed that the QI achieved was far below this. Even during 2015-16 when QI was relatively much better than earlier years, QI for BMP was between 70.28 and 77.4.

(Paragraph 2.5.4)

Delay in dispatch of overhauled equipment to Units

Backlog and delay in overhauls were further compounded by late issue of release orders by Army HQ and delay in dispatch of the equipment by the Ordnance Depots. This delay was mainly due to absence of any laid down norms and time frame for these activities.

(Paragraph 2.4.3,2.5.3, 2.6.2)

Non-availability of testing facilities at the ABWs

As per Original Equipment Manufacturer (OEM) recommendation, test firing of overhauled guns was a mandatory requirement. The BMPs and Tank T-72 overhauled by ABWs were issued to user units without test firing as the ABWs did not have the requisite test facility. Amphibious capability, an important feature of BMP, could not be tested in respect of overhauled BMPs for want of dip testing facility.

(Paragraph 2.4.5,2.5.4)

Inordinate delay in execution of Work Orders at 515 ABW

The primary role of 515 ABW is to undertake manufacture and indigenization of spares for various equipments held by Indian Army. 515 ABW could complete only 27 *per cent* work orders of 'Operational Immediate' category within the laid down time frame. In certain cases, the time taken was up to 93 months against the laid down ceiling of 12 months, thereby defeating the operational urgency. In respect of 'Priority' work orders, the percentage of completion within time frame was 65 *per cent* only.

(Paragraph 2.8.2)

Non-existence of cost accounting system

While the guidelines issued by the Ministry stipulated that the cost of overhaul of vehicle and engine would in no case exceed 30 *per cent* of the cost of new vehicle/engine, no cost accounting mechanism was in place in the ABWs to ensure the cost effectiveness of the repairs and overhauls.

(Paragraph 2.9)

Inordinate delay in creation of Overhaul facilities

- Facility for overhaul of ARV WZT-2 was set up in March 2009 after 28 years of its introduction. The vehicle was due for overhaul since 1996-97, but only 22 ARV WZT-2 could be overhauled against the total strength of 222. The equipment was likely to be de-inducted by 2018.
- Due to delays in initiation and sanction of the Component Level Repair (CLR) project for Tank T-90, not only the project cost escalated from ₹ 287 crore in 2004 to ₹ 1835 crore in 2011 but also the first Medium Repair of Tank T-90 which was due in 2012 was pending.
- Project Tulip, for establishment of additional facilities at 512 ABW, as a nucleus for repairs/overhaul of communication and night vision devices for BMP II/ IIK was sanctioned by the Ministry in January 2003 at a cost of ₹ 22.54 crore. The project was yet to be fully implemented even after a lapse of thirteen years.

(Paragraph 3.2.1,3.2.3 3.3)

Non-utilization of shooting gallery created for proof firing

Shooting gallery constructed at a cost of ₹ 6.53 crore in November 2013 could not be taken over by 512 ABW (May 2016) as it did not have electric and water connection. Besides, 512 ABW did not have authorization of ammunition for test firing of the overhauled guns.

(Paragraph 3.4)

Non-availability of critical spares leading to deviation sanctions

Deviation sanctions were accorded by Master General of Ordnance (MGO) in respect of 398 overhauled BMPs and 179 Tanks T-72. This was necessitated due to non-availability of critical spares and assemblies. The deviations were accorded for vision devices, communication sets, tracks *etc*., thereby impacting the capability of BMPs and T-72 tanks.

(Paragraph 4.2)

3. Key Recommendations

1. In the absence of a policy on overhaul of Class 'B' vehicles in Army, these vehicles are overhauled by the workshops on case to case basis. Ministry may formulate the overhaul policy for Class 'B' vehicles.

2. As MBT Arjun Tanks are due for overhaul from 2020-21, Ministry should explore and expedite indigenous development of components of MBT Arjun and creation of repair and overhaul facilities.

3. Since the issue of T-72 and BMP tanks overhauled by workshops to units without certain vital tests such as proof firing and dip testing have serious operational and quality implications, facilities for these testing must be created at the concerned workshops. Army HQ should expedite operationalisation of shooting gallery at 512 ABW and necessary authorization of ammunition for test firing of overhauled guns.

4. Ministry should expedite the Component Level Repair (CLR) project for supporting Tank T-90 with repair facilities.

5. Overhaul of vision devices is now being carried out at Opto-Electronics Factory (OLF), Dehradun as they had accepted the responsibility of overhaul of complete requirement of vision devices of BMP. In view of this development, Ministry may review the scope and implementation of Project Tulip for establishment of additional facilities at 512 ABW.

6. Cost accounting system should be introduced in the workshops to ensure optimum utilization of resources *viz.* man-power, machines and materials and to assess the cost effectiveness of overhauls.

7. As regards urgent requirement of augmenting availability of spares, constraints in the availability of spare need to be identified and process of making available spares through manufacturing or procurement from Trade/Ordnance Factories need to be streamlined. Reasons for delays in execution of Work Orders at 515 ABW need to be diagnosed and addressed.

8. Quality Index of Overhauled BMP tanks despite improvement during 2015-16 still remains low and needs to be further improved.

Chapter I: Introduction

1.0 Mandate of Army Base Workshops

Army Base Workshops (ABWs) were established during Second World War to carry out repairs and overhaul of weapons, vehicles and equipment to keep the Indian Army operationally ready. In order to ensure battle worthiness of the Indian Army at all times, Overhaul[1] of weapons and equipment has to be a well-planned and comprehensively executed activity, to neutralize effects of age, usage and restoration of the weapon system/ equipment to Zero Hour, Zero Kilometer[2] operational condition. There are eight Army Base Workshops, of which seven are responsible for repair and overhaul of equipment/weapons, and one workshop *i.e.*515 ABW has been tasked with the responsibility of indigenization and manufacture of spares. Table 1 shows the location and mandate of the eight ABWs.

Table 1: Location and Mandate of eight Army Base Workshops

Workshop	Location	Mandate
505 ABW	Delhi	Undertakes depot level repair of Tank T-72 including engines, Scania vehicles including engines, AM-50 bridging system.
506 ABW	Jabalpur (Madhya Pradesh)	Repair of small arms and mortars.
507 ABW	Kankinara (West Bengal)	Repair of Scania vehicles/Kraz vehicles.
508 ABW	Allahabad (Uttar Pradesh)	Repair of Tatra and Scania vehicles.
509 ABW	Agra (Uttar Pradesh)	Repair and overhaul of communication systems, radars, optical including various sights and other electronic equipment and power equipment (Generators).
510 ABW	Meerut (Uttar Pradesh)	Repair and overhaul of Air Defence Weapons Systems, Soldier weapon systems, Gun & specialist vehicles& Engineering Equipments.
512 ABW	Kirkee, Pune (Maharashtra)	Repair and overhaul of ICV BMP II & their variants, Armoured Recovery Vehicles and all AFV engines.
515 ABW	Bengaluru (Karnataka)	Manufacture of spares (Indigenization), manufacture of simulators for field army and overhaul of aviation rotables.

1.1 Organizational Structure

Master General of Ordnance (MGO) functioning under Chief of Army Staff is responsible for ensuring high state availability of weapons, ammunition, equipment, vehicles and stores to the Indian Army during war and peace. MGO is assisted by Director General of Electronics and Mechanical Engineering (DGEME), Director General of Ordnance Services (DGOS), Additional Director General Equipment Management (ADG EM) and Additional Director General Procurement (ADG Proc). Base Workshop Group (BWG) assists DGEME and exercises overall control over the Army Base Workshops (ABW). BWG is responsible for prepration of Long Range Perspective Plan, utilization of resources available with ABWs,

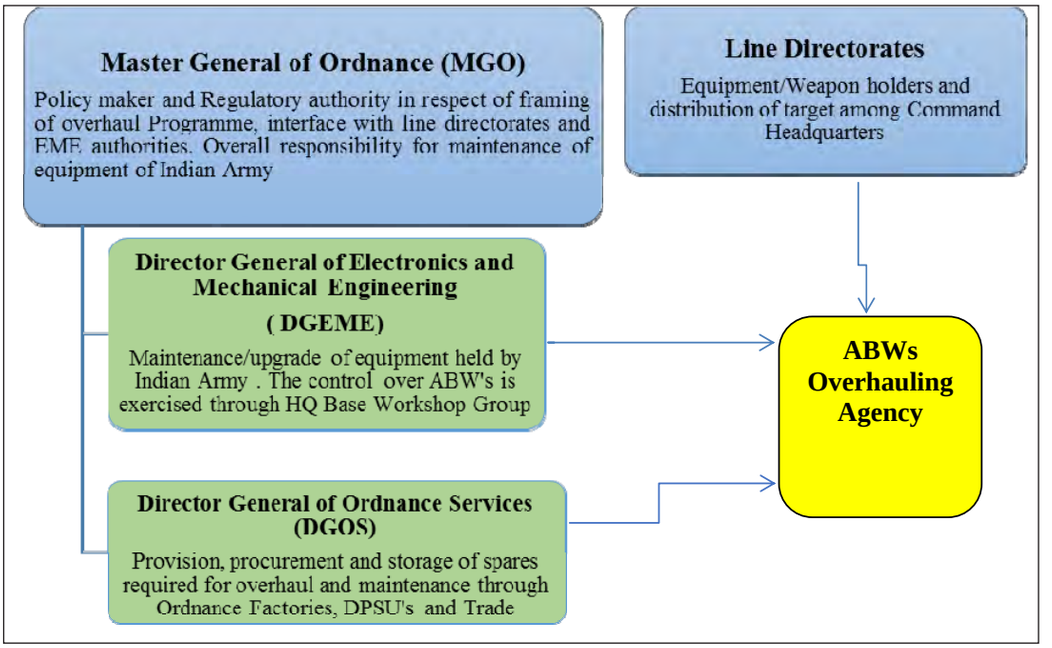
[1] **Overhaul** – Is a critical activity to restore the equipment readiness and neutralize effects of age, usage. This is carried out by stripping the complete equipment and reassembling it by changing the worn out/ damaged parts, repairing, and replacing assemblies which out lived their life.

[2] **Zero Hour, Zero Kilometer**- Restoration of weapon system in as near to new condition by overhaul process.

quality checks of overhauled equipments and allocation /redistribution of manpower within the ABWs.

MGO functions through integrated functioning of multiple internal agencies *viz*. DGEME- for capacities of workshops for loading targets, DGOS- for availability of spares, DG Mechanized Forces and other user Directorates- for availability of repairable[3] and external agencies *viz*. Ordnance Factory Board, Defence PSUs and other PSUs- for ensuring spares supply for completion of targets set for overhaul and maintenance of fleet of equipment and weapons of Indian Army. Agencies involved in overhaul and their responsibilities are detailed in Chart 1.

Chart-1: Agencies involved in overhaul of Army Equipment and Weapons



1.2 Previous Audit Reports and Ministry's response

Review of Army Base Workshop was commented in Report No. 14 of 1992. The important issues highlighted in the report included determination of workshop capacities with reference to manpower alone despite progressive up-gradation of repair techniques as well as automation in the ABWs and non-exploitation of available capacities due to non-availability of repairable and poor backup of spares.

Ministry in its Action Taken Note (August 2000) stated that as the workshops deal with indigenous and imported equipment and spares availability in respect of indigenous equipment was better, as such utilization of manpower and equipment in ABWs which deal

[3] **Repairable**- The equipment due for overhaul activity at ABW, which commences only after receipt of equipment due for overhaul from the feeding depots.

with Indigenous equipment is high. Regarding working out of workshop capacities on the basis of standard man-hours, it was brought out that it was the standard practice.

Working of ABWs was again reviewed and commented under Para No. 3.1 of Audit Report No. 6 of 2005. The report pointed out significant under performance in achievement of overhaul targets, overstatement of capacity utilization, non-availability of spares, delays in overhaul, idling of manpower and delay in creation of overhaul facility. In the Action Taken Note, Ministry stated (November 2006) that for spares management, various steps such as holding of quarterly spares review meeting, target fixation and mid-term review meeting, creation of special task force for monitoring overhaul commitments and regular interaction with Ordnance Branch would be taken up.

1.3 Audit Objectives

Performance Audit of "Working of Army Base Workshops" was taken up to assess the effectiveness of the workshops with regard to timeliness of overhaul, adequacy of infrastructure, timely availability of spares and quality of the repair. The Performance Audit also looked in to the status of assurances given in the Action Taken Notes on earlier reviews. In particular, the audit reviewed;

- Whether the ABWs were able to fulfill their role economically, efficiently and effectively?
- Whether infrastructure available at the ABWs was adequate and modernized timely?
- Whether the spares required for the overhaul were timely provisioned by the Depots and received in time from the supply agencies?
- Whether equipment overhauled met the laid down quality standards?

1.4 Audit Criteria

The audit criteria for the performance evaluation were derived from:

- Army Base Workshop Procedure.
- Five Year Repair Programme framed by MGOs Branch at Army Headquarters.
- Induction Pattern and Overhaul Cycle of the equipment inducted in Army.
- Instructions, Standard Operating Procedures (SOPs), letters issued by DG EME, DGOS, HQ BWG.
- Action Taken Note on Report No 14 of 1992 and Para 3.1 of Audit report No 6 of 2005.
- Special Provision Review Directives, Technical Instructions, and Issue Procedure framed by DGOS for provisioning of spares.
- Overhaul scales for spares framed by DGEME for overhaul of the equipment.

1.5 Scope of Audit

The Performance Audit covered a period of six years from 2010-11 to 2015-16. The audit was carried out at MGO, DGEME and DGOS at New Delhi, HQ BWG at Meerut. Five out of eight Army Base Workshops *viz.* 505 ABW New Delhi, 509 ABW Agra, 510 ABW

Meerut, 512 ABW Kirkee based on the criticality of the equipment to the Indian Army and 515 ABW Bengaluru being the only spares manufacturing workshop were selected for audit. The audit was also carried out at feeding Ordnance Depots (ODs) *viz.* CAFVD Kirkee, COD Delhi, Agra and Dehuroad which are responsible for supply of repairables & spares to respective ABWs & collection of overhauled equipment from ABWs and issue the same to units as per release orders of DGOS. Audit visited three[4] regiments of Infantry Combat Vehicle (ICV) BMP and two[5] Brigades of Tank T-72 for user feedback on overhauled equipment.

1.6 Audit Methodology

An Entry Conference was held with the Ministry of Defence on 14 July 2015. The objective, scope, and methodology of audit were discussed and criteria agreed upon. Detailed audit scrutiny was conducted during July 2015 to January 2016 at the selected ABWs and Ordnance Depots in order to evaluate the performance against the audit criteria. Field audit included examination of records, collection of information through issue of audit observations, replies thereto and Questionnaire**.** Exit Conference chaired by MGO was held on 11 November 2016 wherein important aspects brought out in the Report were discussed.

Replies to the audit observations furnished by the MGO were considered while preparing the report. Reply of the Ministry was awaited (November 2016).

1.7 Audit Findings

The audit findings have been categorized in three chapters viz (i) Effectiveness of Army Base Workshops (ii) Infrastructure and Modernization and (iii) Spares Management.

1.8 Acknowledgement

We gratefully acknowledge the co-operation of officers and staff of the MGO, DGEME, DGOS, HQ BWG, Army Base Workshops, Central Ordnance Depots and user units under DGMF.

[4] **Mechanized Infantry Regiments**- (i) 11 Mech. Inf. Regiment, (ii) 20 Mech. Inf. Regiment and (iii) 6 Guards

[5] **Armoured Regiments** – (i) 16 (Independent) Armoured Brigade and (ii) 3 (Independent) Brigade

Chapter II: Effectiveness of Army Base Workshops

2.0 Importance of overhaul

The Indian Army has a large inventory of weapon systems and equipment which need to be maintained and sustained in battle worthy condition. The decision to overhaul equipment is based on the maintenance philosophy promulgated at the time of induction for the envisaged life cycle as enumerated in Equipment Management Policy Statement (EMPS). The targets of overhaul to be undertaken by ABWs are decided by MGO depending on combination of factors such as periodicity of overhaul as stated in EMPS and condition of equipment, backlog of overhaul, capacity of ABWs and supply of spares by DGOS and various spares supplying agencies.

2.1 Equipment profile

Indian Army holds 23 Class "A" vehicles in its inventory that includes Armoured Fighting Vehicles (AFV), Infantry Combat Vehicles (ICV), Armoured Recovery Vehicles (ARV), Guns and Snow Vehicles. All supporting vehicles are classified as Class "B" equipment.

Considering the important features and criticality in war scenario, the following AFVs/ ICVs and ARVs along with their overhaul agencies have been covered in audit based on the workshop selected for the performance audit as indicated in Table 2 below.

Table-2: Features of the selected Class "A" equipment and their overhauling agency

Equipment	Year of Induction	Important features	Overhauling Agency
Tank T-90	2002	It is the main stay of Armoured Corps.	Overhaul due from 2018. Overhaul Agency yet to be decided. Only component level repair[6] at 505 ABW decided.
MBT Arjun	2004	An indigenously developed Tank with 120 mm rifled bore gun. Critical in NBC war scenario.	Overhaul due from 2020. Overhaul agency yet to be decided.
Tank T-72	1979	It is the Main Tank of the Army. Fitted with 780 HP super charge engine and 125mm smooth bore gun.	505 ABW & Heavy Vehicle Factory (HVF), Avadi
BMP-II	1985	It is an Infantry Combat Vehicle (ICV) with amphibious capabilities and high degree of mobility and provides additional safety to Infantry soldiers.	512 ABW & Ordnance Factory, Medak (OFM)
ARV WZT-3	1999	It is Armoured Recovery Vehicle (ARV) for Tank T-72 and T-90 and its variants.	Consultancy contract for creation of facility at 512 ABW has been concluded.
ARV VT-72B	1994	It is Armoured Recovery Vehicle (ARV) for Tank T-72 and T-90 and its variants.	
ARV WZT-2	1981	It is a recovery vehicle for Tank T-55 and its variants	512 ABW

[6] Component Level Repair- In this facility pool of MUAs (Major Unit Assembly) will be maintained to replace when they become defective. This facility will be setup in the Corps Zone Workshop so that repairs can be carried out in forward areas and Tanks put on road in serviceable state with minimum downtime. The defective MUAs will be repaired and returned to the pool using the proposed "Component Level Repair Facilities". This will enable sustainment of the Tank while providing mission readiness and reliability.

2.2 Maintenance Philosophy and Intervention Norms

MoD published (April 1987) maintenance philosophy for AFVs, ICVs and ARVs based on envisaged service life of 30 years. This was applicable to all the AFVs, ICVs and ARVs in service as well as those to be inducted in future. These norms were revised by the Army HQ in December 2003 and again in February 2014 as shown in Table 3 below:-

Table- 3: Intervention period for maintenance of Class "A" vehicles

Intervention for maintenance	Periodicity as per Policy of 2003 (whichever is earlier)		Periodicity as per Policy of 2014 (whichever is earlier)	
Medium Repair (MR-1)	8-10 Years	2000-2500 KM	10 Years	2400 KM
Overhaul (OH– 1)	15-16 Years	2500-4000 KM	16 Years	3700 KM
Medium Repair (MR -2)	21-22 years	5250-5000 KM	23 years	5400 KM
Overhaul (OH – 2)	-----	-----	29 Years@	6700 KM
Medium Repair (MR -3)	26-27 Years	6500-6750 KM	35 Years#	7900 KM

@For equipment to serve beyond 35 years. Balance equipment to undergo MR instead and de induct after 35 years

Only for OH-2 equipment and service up to or beyond 40 years

Similarly, class 'B' equipment viz. Radars and DG sets are required to be overhauled after 10 years from the date of induction. Second overhaul is due after seven years of first overhaul. In case of Battle Field Surveillance Radar (BFSR), first overhaul is due after seven years.

2.2.1 Maintenance Process

As per extant procedure, an ABW is to be nominated to overhaul particular equipment at the introductory stage itself in order to facilitate long range forecasting and planning. Every year, during overhaul target fixation meeting, targets for current production year are reviewed, and are fixed for the next year and a roll on plan prepared for next three years. The inputs received from ABWs, DGOS, OFB and DPSUs form the basis for revision of targets. The overhaul process starts at ABWs with issue of AHQ repair programme and targets are intimated to all the supply agencies for them to gear up for timely manufacturing, provisioning and supply of spares to ABWs. After receipt of overhaul programme, workshop issues calling in notice demanding the repairable from the feeding depots.

2.3 Backlog in overhaul of important class 'A' equipment

We noticed that the maintenance philosophy and intervention norms for overhaul for class 'A' equipment as implemented, resulted in prolonged delays and backlog in overhaul of important class 'A' equipment as indicated in Table 4 below:-

Table 4:- Backlog of overhaul of important class 'A' equipment

Equipment→	BMP-II and IIK#				ARV WZT-2				Tank-T-72#			
Year	a[7]	b[8]	c[9]	d[10]	a	b	c	d	a	b	c	d
2010-11	2240	949	72	877	222	222	00	222	2418	811	98	713
2011-12	2329	928	124	804	222	222	02	220	2418	793	83	710
2012-13	2368	912	72	840	222	220	02	218	2418	789	126	663
2013-14	2412	939	121	818	222	218	02	216	2418	727	140	587
2014-15	2412	980	145	835	222	216	03	213	2418	664	160	504
2015-16	2412	892	90	802	222	213	13	200	2418	612	133	479

Overhauled BMPs include BMPs overhauled by OF, Medak and overhauled T-72 Tank include Tanks overhauled by Heavy Vehicle Factory, Avadi.

It can be seen from the Table above that, on the average, 35 *per cent* of the total fleet of BMP has been due for overhaul during 2010-11 to 2015-16, which has reduced the effective availability of the fleet for the operations. Since 512 ABW and OF Medak had together annually overhauled only 104 BMPs on an average during this period, the possibility of liquidating the backlog to make the entire fleet operational in near future does not look bright.

In case of ARV WZT-2, where the entire fleet was due for overhaul in 2010, only 22 (10 *per cent*) of the total fleet had been overhauled during the period 2010-11 to 2015-16 and 168 were held at CAFVD, Kirkee and 512 ABW in Class V (off-road) condition awaiting overhaul.

Though the backlog in overhaul of Tank T-72 has been reduced from 713 in 2010-11 to 479 Tanks in 2015-16, it is still on higher side representing 20 *per cent* of the total population, as T-72 is a main battle Tank of the Indian Army.

2.3.1 Backlog in overhaul of important Signal equipment

We noticed that non-observance of the maintenance philosophy and intervention norms of the signal equipment coupled with prolonged delays resulted in backlog of its overhaul as indicated in Table 5 below:-

Table-5: Backlog of overhaul of Signal equipment

Equipment	Induction years	Total population held	Total due for overhaul	Equipment overhauled up to 31.03.2016			Backlog of first and second overhaul
				1st over-haul	2nd over-haul	Total over-hauled	
Radar Fly Catcher	1987 to 2008	215	1stOH-168 2nd OH-77	138	58	196	1stOH- 30 2nd OH- 19
Radar TC reporter	1996 to 2005	92	1stOH-74 2ndOH-00	49	00	49	1 stOH-25 2nd OH- 00

[7] a- Total population
[8] b- Equipment due for OH as of March each year including backlog from previous years
[9] c- Overhauled during the Year.
[10] d- Backlog

Battle Field Surveillance Radar (BFSR) Medium Range	2001 to 2013	252	1 stOH-201	159	00	159	1st OH- 42
19 KVA DG set	Records not available in ABW	307	1st OH-242 2ndOH-77	187	58	245	1st OH- 55 2nd OH- 19

We observed backlog in first overhaul of 18 *per cent* of Radar Fly Catcher, 34 *per cent* of Radar TC Reporter and 21 *per cent* of Battle Field Surveillance Radar.

We observed that the backlog in overhaul of the equipment as discussed above was due to the deficiencies in implementation of its maintenance philosophy and intervention norms such as downward revision of the targets every year and delay in overhaul. These have an adverse impact on operational readiness. The performance of each selected ABW is commented in succeeding paragraphs.

2.4 505 Army Base Workshop (ABW), New Delhi

505 ABW undertakes the overhaul of Tank T-72 including its engines, Scania vehicles, AM-50 bridging system. The 505 ABW obtains the repairables and handover the overhauled equipment to Central Vehicle Depot (CVD), Delhi which is designated feeding depot for 505 ABW.

2.4.1 Non achievement of overhaul targets

Our scrutiny of minutes of Mid-term Review meetings held during the audit period revealed that every year targets were revised. The details of targets originally assigned, subsequently revised and achieved are indicated in Table 6 below:-

Table-6: Non-achievement of Overhaul Targets at 505 ABW

Equipment→	**Tank T-72**			**Engine T-72**			**ColosTatra**		
Year	**O**[11]	**R**[12]	**A**[13]	**O**	**R**	**A**	**O**	**R**	**A**
2010-11	**50**	**40**	**35**	**50**	**60**	**30**	**Nil**	**20**	**20**
2011-12	**50**	**50**	**10**	**100**	**21**	**07**	**30**	**20**	**06**
2012-13	**60**	**50**	**50**	**136**	**80**	**71**	**10**	**10**	**10**
2013-14	**50**	**40**	**30**	**100**	**80**	**72**	**10**	**10**	**10**
2014-15	**50**	**40**	**40**	**100**	**60**	**60**	**03**	**03**	**03**
2015-16	**50**	**50**	**40**	**100**	**100**	**100**	**Nil**	**Nil**	**Nil**

As seen from the above table, there was shortfall in achieving the targets *vis a vis* original targets in respect of Tank T-72 ranging from 17 to 80 *per cent.* In respect of Engines of T-72, it ranged between 0 and 93 *per cent.* 505 ABW could not achieve the original and the revised targets that were fixed in the Midterm Review meetings.

[11]**'O'** Original Target
[12]**R'** Revised Target
[13]**'A'** Achievement. The overhauls completed during the year are reflected as achievement

MGO, in reply (May 2016) stated that delay in overhaul was mainly due to non availability of spares by OFs and DPSUs. The contention of MGO is not plausible as the responsibility for availability of spares also rests with MGO. Hence it was incumbent on them to make sure that the spares authorized as per overhaul scales were made available in full range and depth before the start of production year.

The non-availability of critical spares and production hold up items as noticed during current review has been discussed in Para No 4.1.1 of Chapter IV.

2.4.2 Delay in overhaul

In order to effectively and efficiently manage the overhaul of various equipments, BWG had specified norms indicating the maximum time required for the activity. We however observed that despite the downward revision in target during the currency of the year, there was inordinate delay in overhauling the equipment as against the stipulated timelines.

As per existing norms, the overhaul of Tank T-72 is required to be completed within 144 days. We however observed that Tank T-72 could not be overhauled in stipulated time frame. Actual time taken for overhaul of each Tank during 2010-11 to 2013-14 exceeded the norm of 144 days and delay ranged between two to three years. Table 7 below explains the status of delay in overhaul during the last six years which shows the status of Tanks taken up for overhaul during that year and time taken for their overhauling by the ABW.

Table 7: Delay in overhaul of Tank T-72

Year	Eqpt. taken up for OH (No.)	Overhauled (No)	Overhauled within time frame	Time take for overhaul (days)		Time taken for overhaul excluding time frame	
				Minimum	Maximum	Minimum	Maximum
2010-11	54	53[14]	00	378	877	234	733
2011-12	29	29	00	372	980	228	836
2012-13	36	36	00	247	914	103	770
2013-14	15	15	00	456	688	312	544
2014-15	40	40	00	356	577	212	433
2015-16	50	40	00	212	408	68	264

MGO in reply stated (May 2016) that the delay in overhaul was solely due to non-availability of spares. Contention of MGO is not plausible as the responsibility for availability of spares also rests with MGO.

2.4.3 Delay in issue of overhauled Tank T-72 to Units

On completion of overhaul, the overhauled equipments are collected by the feeding Depots. Thereafter, DGOS issues release orders, after consulting MGO Branch, Line Directorate (Users) and MISO (Management Information System Organization), to feeding Depots for issue of the overhauled equipment to concerned field units.

As per the policy on improving the quality of overhauls, the overhauled equipments are required to be handed over to the Depots by the Workshops within seven days. After receipt

[14] One tank T-72 has been declared Beyond Economic Repairs (BER)

of the overhauled equipment, the depots inform DGOS regarding availability of equipment for issue of release orders. We observed that in most of the cases, the ABWs adhered to the laid down time schedule for issue of overhauled equipments. The efficiency of the Workshops in timely issue of the equipment was however defeated by the delays in release and dispatch of equipment by the Ordnance Depots.

We observed that as far as release of equipment by DGOS and time frame for dispatch of equipment by Depots to the units was concerned, no laid down Standard Operating Procedure (SOP) had been framed. As a result, there was no consistency in issue of release orders (RO) by AHQ. In some cases, the release orders were issued even before completion of overhaul while as in other cases RO was delayed by more than a year.

a. Delay in issue of Release Order (RO)

We observed that out of 181 overhauled Tanks, only in five cases ROs were issued before collection of tank by CVD. ROs in 151 cases were issued within two months and in 11 cases ranged from two months to a year. In two cases of Tanks overhauled in 2011-12, ROs are yet to be issued. Details as indicated in Table 8 below:

Table-8: Delay in issue of RO in respect of overhauled Tank T-72

Year	No of overhauled T-72 Tanks collected by CVD	Issue Orders floated by AHQ					
		Prior to collection	0-60 days	61-120 days	121-180 days	181-365 days	366 days & above
2010-11	17	00	01	08	02	06	00
2011-12	33@	02	26	03	00	00	00
2012-13	35	02	26	04	02	01	00
2013-14	28	01	23	04	00	00	00
2014-15	28	00	28	00	00	00	00
2015-16	40@	00	27	01	00	00	00
Total-	**181**	**5**	**131**	**20**	**4**	**7**	**0**

@ In two cases of 2011-12 and 12 cases of 2015-16 Release orders are yet to be floated (March 2016)

Contrary to the facts, in reply, MGO stated (July 2016) that there was no delay on their part to initiate release order, which was done within two weeks.

b. Delay in dispatch

Out of 181 overhauled Tanks collected by CVD Delhi Cantt, 23 Tanks are yet to be issued to the units and in 78 Tanks, there was a delay ranging from two to 24 months in issue as indicated in Table 9 below**:**

Table-9: Time taken in dispatch of overhauled Tank T-72 collected by CVD

Year	No of overhauled T-72 collected by CVD	Time taken in dispatch of overhauled T-72 collected by CVD.						
		Up to 2 Months	2 to 4 Months	4 to 6 Months	6 to 12 Months	12 to 24 Months	24 Months and above	Yet to be issued
2010-11	17	13	01	00	03	00	00	
2011-12	33	19	04	03	01	04	00	2
2012-13	35	21	03	07	00	03	01	-
2013-14	28	07	01	04	07	04	05	-
2014-15	28	11	06	05	02	02	01	1
2015-16	40	09	03	04	02	01	01	20
Total	**181**	**80**	**18**	**23**	**15**	**14**	**8**	**23**

2.4.4 Quality Index of overhauled equipment and engines

The aim of overhaul of equipment is to restore the Army equipment in readiness by neutralizing the effects of age, usage and deployment. The Technical Group EME (TGEME) functioning under DGEME, had suggested (August 1994) a detailed procedure for improvement in quality of overhauled equipment. The procedure necessitated thorough inspection at various stages by inspection staff of ABWs, at critical stages by Resident Inspectors (RI) and final inspection of the completely Overhauled equipment by RI.

HQ BWG, with an aim to improve the quality of overhauled equipment, engines and major assemblies also issued (August 2004) a Technical Directive to measure the Quality Index (QI) of overhauled equipment. QI is a performance indicator to evaluate the quality performance of an overhauled equipment against specifications laid down by the manufacturers. QI will be low if equipment is found to have defects during final testing by the Quality Control of the BWG.

As per the directive, QI for overhauled Tank T-72 should be 95. We observed that the QI achieved was below the limit prescribed in Technical Instruction and the equipment had been cleared for issue to the depots despite the shortfall. The Quality Index achieved in respect of Tank T-72 is shown in Table 10 below:

Table-10: Quality index of overhauled Tank T-72

Year	Tank T-72	
	Minimum	Maximum
2010-11	87.8	91.98
2011-12	86.51	92.44
2012-13	84.73	91.93
2013-14	90.3	92.20
2014-15	83.80	92.13
2015-16	87.25	92.2

In reply, MGO (May 2016) attributed non achievement of the target quality index to non-availability of spares and the shortfall was made from reclamation and self-manufacture of spares. The reply was suggestive of the fact that purpose of overhaul to achieve 'Zero Hour Zero Kilometer' status could not be achieved.

2.4.5 Issue of overhauled equipment without testing

We observed that due to non availability of certain vital test facilities, the overhauled equipment were issued to the units without testing as detailed below:-

i. Issue of over hauled Tank T-72 without test firing

The ABW lacks test firing facility for T-72 Tanks. However, MGO Branch had accorded special sanction to roll out the Tanks without test firing on the condition that activity would be carried out during initial firing of the affected units.

ii. Vital deficiency of Special Machine Tools (SMTs), Special Tools Equipment (STEs) and Tools/Jigs (TJs)

We observed that the ABW was deficient in Special Machine Tools/Special Test Equipment/ Tools Jigs like universal gun pull back apparatus, composite ring required for Quality Checks (QC) on the Gun portion of T-72, Multipurpose sling device for carrying out quality checks on auto portion of T-72, Eye bolt for mounting and dismounting gear box and Guard disc for installation and removal of road wheels without disconnecting the tracks. The deficiency of vital SMTs/STEs/TJs was reported since 2011-12.

2.5 512 Army Base Workshop (ABW), Kirkee

The 512 ABW is assigned the task of repair and overhaul of BMP II & their variants, ARVs and engines pertaining to BMPs (UTD-20 Engine). The ABW obtains the repairables and handover the overhauled vehicles to CAFVD which is the designated feeding depot for 512 ABW.

2.5.1 Non achievement of overhaul targets

512 ABW also could not achieve the original and revised targets that were fixed in the Mid-term Review meetings. Details of targets originally assigned, subsequently revised and achieved as indicated below in Table 11**:**

Table- 11: Non-achievement of Overhaul Targets at 512 ABW

Equipment→	BMP II/IIK			ARV WZT-2			UTD- 20 Engines		
Year	O	R	A	O	R	A	O	R	A
2010-11	120	46	46	10	4	Nil	150	135	135
2011-12	100	85	85	10	2	2	150	110	110
2012-13	116 + 4 (IIK)	96	85	2	2	2	150	50	41
2013-14	114 + 6 IIK	120	102 + 2 (IIK)	2	2	Nil	150	150	115
2014-15	145 + 5 (IIK)	96 + 9 (IIK)	97 + 9 (IIK)	2	10	03	150	135	147
2015-16	150	150	70	20	13	13	150	150	150

As seen from the above table, there was shortfall in achieving the targets *vis a vis* original targets in respect of BMP ranging from 13 to 62 *per cent*, in respect of ARV WZT-2 ranging from 0 to 100 *per cent* and in respect of UTD-20 engines, it ranged between 0 to 73 *per cent.*

512 ABW while agreeing with the audit findings stated (July 2015) that failure to supply repairable or spares in time as per requirement led to non-achievement of laid down targets and consequent downward revision. They further stated that 110 overhauled BMPs were held by them due to non-availability of certain critical spares/assemblies, for which deviation[15] sanctions were awaited.

Thus despite assurance by the Ministry in 2005 to improve the availability of spares, ABWs did not get sufficient spares to meet their overhaul targets leading to backlog and consequently impacting operational readiness. However, as far as availability of repairable was concerned, we found that 512 ABW was holding more BMPs than the target assigned to them, hence non availability of repairable cannot be a reason for non-achievement of targets.

2.5.2 Delay in overhaul

As per existing norms, the overhaul of BMP vehicle is required to be completed within a timeframe of 153 days. For overhaul of an Engine in ideal conditions, 512 ABW had set a time frame of one month.

We however observed that BMP and engines could not be overhauled in stipulated time frame. During the period under review, the time taken for the overhaul of BMP ranged up to 1512 days. Hence not only was the availability of the equipment denied by such delay, even the effective life (13 *per cent*) of the equipment was also lost due to the hold up. Similarly, average time taken for overhaul of each UTD-20 engine for BMP was 308 days which was 10 times of the stipulated time frame of 30 days. Table 12 below indicates the status of delay in overhaul during the last six years.

Table 12: Delay in overhaul

Year	Equipment	Eqpt. taken up for OH (No.)	Over hauled (No)	Over hauled within time frame	Time taken for overhaul (days)		Time taken for overhaul excluding time frame	
					Minimum	Maximum	Minimum	Maximum
2010-11	BMP	73	73	00	243	1512	90	1359
	UTD engine	130	130	00	167	799	137	769
2011-12	BMP	53	53	00	324	1154	171	1001
	UTD engine	116	116	00	209	829	179	799
2012-13	BMP	79	79	00	737	962	584	808
	UTD engine	56	56	00	257	693	227	663
2013-14	BMP	113	113	00	502	618	349	465
	UTD engine	61	61	00	88	521	58	491
2014-15	BMP	56	36#	00	333	616	180	463
	UTD engine	78	68	00	406	152	376	122
2015-16	BMP	96	00#	00	-	-	-	-
	UTD engine	156	66	00	310	74	280	44

 # Twenty BMPs taken for overhaul in the year 2014-15 and all the BMPs taken for overhaul in the year 2015-16 were pending for overhaul as of 31 March 2016.

[15] **Deviation Sanctions-** Deviation means deviating from the standard norms prescribed for overhaul of a particular equipment *i.e*. Fitment items not fitted, not carrying out all the tests, use of retrieved material *etc*. These sanctions are accorded by MGO in consultation with line directorates.

MGO in reply stated (May 2016) that the ideal through put time was based on the premise that spares authorized as per overhaul scale were placed before the start of the Production year. Delay in overhaul was solely due to non-availability of spares.

2.5.3 Delay in issue of overhauled equipment to Units

Delay caused due to late issue of RO and delayed dispatch by CAFVD, Kirkee is analysed as follows:

(a) Delay in issue of release order (RO):

Delay in issue of RO by DGOS in respect of 102 out of 499 BMPs overhauled by 512 ABW and collected by CAFVD during the period under review ranged from two months to more than a year, as indicated in Table 13 below:

Table-13: Delay in issue of RO in respect of overhauled BMPs

Year	No of overhauled BMPs collected by CAFVD	Release Orders issued by AHQ					
		Prior to collection	0-60 days	61-120 days	121-180 days	181-365 days	366 days & above
2010-11	110	47	09	15	19	18	02
2011-12	51	45	-	-	-	-	06
2012-13	54	38	09	02	03	02	-
2013-14	24	09	08	02	-	05	-
2014-15	77	40	35	-	01	01	-
2015-16 @	183	09	99	16	10	-	-
Total-	**499**	**188**	**160**	**35**	**33**	**26**	**08**

@ Release orders in respect of 49 BMPs are yet to be floated as of March 2016

In reply, MGO stated (July 2016) that there was no delay on their part to initiate release order, which was done within two weeks of receiving the list of available BMPs from CAFVD Kirkee**.**The reply is suggestive of the fact that delay has occurred at the level of CAFVD, Kirkee, which is a part of Ordnance Branch, functioning under MGO. Hence shifting of responsibility to the Depot was not in order.

(b) Delay in dispatch

Besides the delay in issue of release orders by DGOS, there was a further delay in dispatch of BMPs by CAFVD to units/formations even after the issue of release orders by AHQ as indicated in Table 14 below:

Table-14: Time taken in dispatch of overhauled BMPs collected by CAFVD

Year	No of overhauled BMPs collected by CAFVD	Time taken in dispatch of overhauled BMPs collected by CAFVD					
		0-60 days	61-120 days	121-180 days	181-365 days	366-730 days	More than 730 days.
2010-11	110	06	46	27	29	01	01
2011-12	51	15	08	01	02	22	03
2012-13	54	09	10	10	13	12	-
2013-14	24	-	-	04	-	20	-
2014-15	77	12	40	18	07	-	-
2015-16	183	65	33	03	-	-	-
Total	**499**	**107**	**137**	**63**	**51**	**55**	**04**

Note- 82 BMPs were yet to be issued as of March 2016

We observed that in 12 *per cent* cases *(i.e.* 51 out of 417), there was delay of more than six months to a year and in 14 *per cent* cases (*i.e.* 59 out of 417) the delay was more than one year (Maximum delay 1796 days), in dispatch of overhauled BMPs to concerned units after the receipt of the ROs from Army HQ.

2.5.4 Quality of overhauled BMPs

We observed that overhauled BMPs issued to users were also low in Quality Index due to use of poor quality material and poor workmanship. Even the ABW lacked adequate testing facilities as brought out below:-

(i) Low Quality Index

As per the directive, QI for overhauled BMP should be 95. We observed that the QI achieved was far below the limit prescribed in Technical Instruction and the equipment had been cleared for issue to the depots despite the shortfall. The quality Index achieved for BMP is shown in Table 15 below:

Table-15: Quality index of overhauled equipment.

Year	BMP	
	Minimum	Maximum
2010-11	31.44	65.83
2011-12	60.65	70.04
2012-13	57.10	75.37
2013-14*	-	-
2014-15	58.40	71.84
2015-16	70.28	77.40

*Inspection was not carried out by QA wing of BWG during the period.

We observed that defects were recurring over the years and the numbers of defects in the major sub systems of BMP showed increased trend. For the Automotive Portion while the types of defects were only 10 in 2010-11, the same increased to 126 in 2014-15. Similarly there was an increase in the type of defects in Armament Portion, Instrument Portion, TCM portion and Electric Portion by 480 to 1017 *per cent.* System wise defects during the last six years are summarized in Table 16 below:-

Table-16: Defect frequency of overhauled equipment

Year	Automotive Portion		Armament Portion		Instrument portion		TCM portion		Electric Portion	
	Type of defects	Total No. of defects	Type of defects	Total No. of defects	Type of defects	Total No. of defects	Type of defects	Total No. of defects	Type of defects	Total No. of defects
July 2010- June 2011	10	NA	4	NA	5	NA	6	NA	4	NA
July 2011- June 2012	19	419	4	87	21	537	8	123	8	157
July 2012- June 2013	35	836	8	180	41	1481	38	553	7	56
July 2013- June 2014	88	2945	19	273	14	284	21	483	27	187
July 2014-June 2015	126	3081	34	630	24	429	61	787	31	384
July 2015 –March 2016	NA	6334	NA	1769	NA	1913	NA	2645	NA	1236

NA= Not Available

In reply, MGO (May 2016) attributed low quality index to non-availability of spares and the shortfall was made from reclamation and self manufacture of spares.The reply was suggestive of the fact that purpose of overhaul to achieve 'Zero Hour Zero Kilometer' status was not achieved and the equipment were issued with compromised quality.

(ii) Issue of overhauled equipment without testing

We observed that due to non availability of certain vital test facilities at 512 ABW, the overhauled equipment were issued to the units without testing as detailed below:-

A. Ad-hoc testing of amphibious capabilities of overhauled BMPs

The counter weight of Hull is required for dip testing and checking the amphibious capabilities of overhauled BMP.This test is a pre requisite as per OEM recommendations.

We observed that in the absence of counter weight of Hull, test was carried out by making workers stand on the hull being tested.

In reply, MGO stated (May 2016) that the amphibious testing of overhauled BMPs is full proof. They further stated that in absence of counter weight as per dimensions given by OEM the equivalent weight is put on BMP under test to ascertain perfect floatation. However the fact remains that the mandatory test is being carried out without proper test facility as per the recommendation of the OEM.

B. Issue of BMPs without test firing

Due to lack of test firing facility and ammunition at 512 ABW, overhauled BMPs were issued without proof firing. The case has been discussed in the Paragraph 3.4 of Chapter III.

In reply MGO stated (May 2016) that teams from the ABW were associated during test firing at user firing ranges, hence 100 *per cent* proof firing was being done. The reply is not tenable as the equipment should have been issued to user units after complete testing.

C. Vital deficiency of Special Machine Tools (SMTs), Special Tools Equipment (STEs) and Tools/Jigs (TJs)

We observed that the ABW was deficient in Special Machine Tools/Special Test Equipment/ Test Jigs like universal gun pull back apparatus, Eye bolt for mounting and dismounting gear box and Guard disc for installation and removal of road wheels without disconnecting the tracks. The deficiency of vital SMTs/STEs/TJs was reported since 2011-12.

In reply HQ BWG stated (September 2015) that the digital tools were demanded to enhance efficiency and save time but these had not been received yet. In the absence of digital test equipment, QA/QC checking was done with conventional instruments.

The reply that QA/QC check was being done with conventional methods was indicative of the fact that the QA/QC checking in the absence of these test equipment was not only time consuming but also less efficient. This also has an impact on quality of overhaul.

(iii) Feedback of overhauled equipment from the Users

HQ BWG (January 2005) issued Technical Directive for obtaining feedback report on equipment overhauled by ABWs within six months after equipment reached the user. The feedback report has to rate the overhauled equipment in three categories *viz.* Excellent, Good and Satisfactory.

We observed that feedback reports on the quality of work carried out by ABW in overhaul consisted of barrel spring broken during firing, oil pump leaking, fly wheel leaking, deficient tools and accessories, unsatisfactory night vision *etc*. Non-supply of vital equipment like gun, vision sights, maintenance kits etc. with overhauled BMPs did not serve the purpose of 'Zero Hour Zero Kilometers'. Despite these shortcomings we observed that out of 295 feedback reports received during the period under review, 16 were graded as 'Excellent', 132 'Good' and 147 'Satisfactory'.

In reply MGO stated (May 2016) that the user perceives overhauled equipment as either 'fit' or 'unfit' for war and accordingly writes only good or satisfactory. Hence co-relation to overhaul performance in conjunction with categorization by users has no relevance. Reply is not tenable as 'fit' or 'unfit' are not the criteria on which quality of overhaul is assessed under feedback. The deficiency in supply of vital equipment coupled with the fact that only five *per cent* of the overhaul was termed "excellent" is a comment on the quality of the overhaul.

2.6 509 Army Base Workshop (ABW), Agra

509 ABW is responsible for repair and overhaul of communication systems, radars and other electronic equipment including diesel generators. User units directly deposit their equipment due for overhaul and collect the same after overhaul from the ABW.

The details of targets originally assigned, subsequently revised and achieved in overhaul of signal equipment are indicated below in Table-17:

Table17:- Non-achievement of Overhaul Targets for signal equipment

Equipment→	Rdr Fly Catcher			Rdr TC Reporter			BFSR (MR)			Gen set 30 KVA		
Year	O	R	A	O	R	A	O	R	A	O	R	A
2010-11	12	12	12	5	5	5	25	25	25	55	55	55
2011-12	24	18	18	10	5	5	25	19	19	65	44	44
2012-13	24	18	18	15	08	08	25	20	20	65	32	32
2013-14	24	12	12	15	07	07	25	25	25	30	24	24
2014-15	24	12	12	15	06	06	25	25	25	65	25	25
2015-16	30	30	24	15	15	14	-	-	-	55	55	40

As seen from the above table, there were shortfalls in achieving the targets *vis a vis* original targets up to 50 *per cent* in respect of Radar Fly Catcher, up to 60 *per cen*t in respect of Radar TC Reporter and 62 *per cent* in respect of Gen Set 30 KVA. In case of BFSR (MR) there was marginal shortfall during 2011-13.

MGO in reply stated (May 2016) that the targets could not be achieved due to non- availability of spares from Ordnance Factories/ DPSUs and slow pace of indigenization. The other reasons for non-achievement of the targets was non-availability of repairable as equipment due for overhaul cannot be de-inducted at the same time from the operational area due to operational reasons. However, the fact remains that a major component of critical signal and surveillance equipment are yet to be overhauled thereby compromising communication and surveillance activities.

2.6.1 Delay in overhaul of Signal equipments

Time-frames for overhaul of radars / generator sets were also prefixed. We, however, observed that time taken for overhaul of these equipments during the review period has invariably exceeded the laid down time-frame. Out of 381 signal equipment overhauled during the six years, only nine equipments were overhauled in time. The delay ranged up to 921 days in case of Flycatcher radar. Delay in overhaul of these equipments during the period under review is indicated in Table 18 below:

Table-18: Delay in overhaul of equipment at 509 ABW

Equipment	Eqpt Over-hauled (Nos.)	Time for overhaul as per norms (in days)	Equipment overhauled				Maximum time taken for overhaul (in days)	Average time taken for overhaul (in days)
			Within the prescribed time limit	within 100 days	Between 101 to 200 days	201 days and above		
Radar Flycatcher	96	70	09	13	40	34	921	200
TC Reporter	45	70	00	01	09	35	467	314
BFSR (MR)	109	07	00	39	44	26	664	146
Gen Set 30 KVA	131	21	00	12	45	74	544	241
Total	**381**	-	**9**	**65**	**138**	**169**	-	-

2.6.2 Delay in dispatch of signal equipments to the units

We observed that following equipment overhauled during 2010-11 to 2015-16 by 509 ABW were not issued (March 2016) to the user unit due to non-reporting of collection parties from units. The equipments were still held in the Workshop. Year wise details of such equipment are shown in Table 19 below:

Table-19: Overhauled equipment yet to be collected by units

Year	Type of equipment				Total Equipment
	Telecom	Instruments	Radar	Power	
2010-11	01	01	-	-	02
2011-12	-	-	05	-	05
2012-13	04	-	35	01	40
2013-14	09	20	09	03	41
2014-15	27	65	24	-	116
2015-16	-	-	10	16	26

2.7 510 Army Base Workshop (ABW), Meerut

510 ABW undertakes overhaul of various engineering equipment and specialist vehicles. The details of targets originally assigned, subsequently revised and achieved in overhaul of the equipment are indicated in Table-20 below:

Table-20: Status of Achievement of Overhaul Targets

Eqpt→	Fagot/ Konkur			Flame launcher I&II			Zil 131			KolosTatra			HRV AV 15		
Year	O	R	A	O	R	A	O	R	A	O	R	A	O	R	A
2010-11	300	200	200	25	25	25	35	38	38	80	50	52	-	-	-
2011-12	225	225	250	50	50	50	40	40	37	50	50	50	-	1	1
2012-13	250	250	250	100	65	66	40	42	42	60	60	60	5	5	5
2013-14	350	320	306	100	85	107	45	35	32	50	50	52	10	10	8
2014-15	380	380	380	70	70	71	40	38	38	20	25	27	10	9	1
2015-16	380	380	380	70	77	77	25	25	27	30	30	30	15	15	15

As seen from the above table, 510 ABW had generally achieved the targets of overhaul except for Fagot/ Konkur in 2013-14, Zil 131 in 2011-12 & 2013-14 and HRV AV 15 in 2013-14 & 2014-15.

2.7.1 Non-Formulation of overhaul policy for Class “B” vehicles - Scania, Tatra and Kraz

MoD in Action Taken Note on Report No. 14 of 1992 on “Review of Army Base Workshops” had stated that an Equipment Management Policy Statement is issued by the MGO’s branch in consultation with Users, Ordnance and EME directorate before an equipment is inducted.

We however, observed that no overhaul policy for Scania, Kraz-255B/B1 and Tatra T-815 was available with HQ BWG and the concerned workshops. Presently, Base workshops are accepting these vehicles of eight years vintage and above for overhaul as per the direction of EME Directorate.

2.8 515 Army Base Workshop (ABW), Bengaluru

The primary role of 515 ABW is to undertake manufacture and indigenization of spares for various equipments held by Indian Army. Besides, the workshop also manufactures simulators for field army and overhaul of aviation rotables.

We analyzed the performance of the workshop to assess its effectiveness with reference to the role assigned and found that the workshop had not commenced the overhaul of aviation rotables. Further, the workshop was not able to adhere to the time schedule allotted for manufacture of spares. Our findings are discussed below.

2.8.1 Non-commencement of overhaul of aviation rotables

The overhaul of rotables of Chetak and Cheetah Helicopters in the Indian Army was being undertaken by Hindustan Aeronautics Ltd. In order to meet the future engineering support requirements, the ABW was assigned the responsibility to undertake the overhaul of aviation rotables by AHQ in 2005. We observed that MoD, in June 2011 accorded sanction for overhaul of 99 rotables. The target was subsequently reduced to 23 by MGO (Avn) in December 2014.

MoD in December 2006 sanctioned Civil Works for a Repair Shed at an estimated cost of ₹ 1.94 crore, later revised to ₹ 3.20 crore in April 2008. Construction of the Repair Shed was completed in April 2010.The ABW during the period September 2005 and October 2014 procured 76 Plant, Machinery and Special Equipments (PMSE) out of which cost of 56 PMSEs was ₹ 48.96 lakh. 47 personnel were also posted for the purpose of overhaul. However, no overhaul could commence (December 2015) as the ABW had not been put on the dependency list of Central Aviation Supply Depot (CASD) by MGO (Avn) for supply of rotables and spares for overhaul.

In reply to our query as to why overhaul of rotables was not commenced, it was informed (December 2015) that DGOS had expressed reservations to MGO (Avn) about repair and overhaul of rotables at the ABW, stating that presently HAL was providing comprehensive repair and overhaul facilities to meet urgent requirements and HAL located at the same station was able to meet the targets.

MGO stated (May 2016) that overhaul activities for 13 of 23 rotables has been commenced from the production year 2016-17. As an overhaul facility was already available at HAL and as only 23 out of 118 rotables will be overhauled, creation of infrastructure at a cost of ₹ 3.69 crore at 515 ABW was un-warranted.

2.8.2 Inordinate delay in execution of Work Orders

The Work Orders (WOs) for manufacture of spares are prioritized in three categories based on the urgency projected by the indentor as shown below in Table 21**:**

Table-21: Classification of Work Orders

Category	Period of completion
Operational Immediate (OPI)	To be completed within 12 months.
Priority (PTY)	To be completed within 24 months
Routine (RUT)	To be completed within 36 months

We observed that only 27 *per cent* work orders of 'OPI' category placed on the ABW by Ordnance Depots were completed within the time frame. In certain cases, the time taken was up to 93 months defeating the very purpose of processing under OPI category. In respect of 'Priority' and 'Routine' work orders, the percentage of completion within time frame was 65 *per cent* and 90 *per cen*t respectively as indicated in Table 22 below:-

Table-22: Time taken for manufacture of spares.

OPI Category					
Year	**Total number of WO completed**	**Within One year**	**One to Two years**	**Two years and above**	**Maximum period in months**
2010-11	258	151	73	34	66 Months
2011-12	353	116	183	54	86 Months
2012-13	167	29	61	77	65 Months
2013-14	252	67	56	129	76 Months
2014-15	210	11	49	150	93 Months
2015-16	180	11	09	160	84 Months
Total	**1420**	**385**	**431**	**604**	
PTY Category					
Year	**Total number of WO completed**	**Within Two years**	**Two to Three years**	**Three years and above**	**Maximum period in months**
2010-11	175	136	29	10	47 Months
2011-12	167	112	36	19	57 Months
2012-13	149	109	18	22	75 Months
2013-14	238	163	12	63	79 Months
2014-15	217	119	26	72	80 Months
2015-16	155	78	30	47	79 Months
Total	**1101**	**717**	**151**	**233**	
RUT Category					
Year	**Total number of WO completed**	**Within Three year**	**Three to Four years**	**Four years and above**	**Maximum period in months**
2010-11	295	290	04	01	51 Months
2011-12	278	269	07	02	57 Months
2012-13	360	333	26	01	49 Months
2013-14	412	348	17	47	60 Months
2014-15	471	403	38	30	93 Months
2015-16	529	456	59	14	72 Months
Total	**2345**	**2099**	**151**	**95**	

From the above Table, it could be seen that maximum delay was in OPI category and the number of WOs completed within the time frame was decreasing over the years. Most of these WOs were placed on the ABW by various Ordnance depots for manufacture of spares required for overhaul of equipment.

We further observed that as of March 2016, 1348 Work orders were pending as against 1707 pending for execution as on 1 April 2010. Age-wise analysis of the outstanding work orders revealed that oldest outstanding work orders were of 2007-08.

MGO in reply (May 2016) attributed the delay in manufacture not only to non-receipt of samples, drawings and delay in procurement of material but also to delay in material testing and production failures.

Notwithstanding the reasons cited by the MGO, the fact of the matter is that delayed manufacturing is affecting the availability of spares required for overhaul. As the ABW was tasked with indigenization and manufacture of spares, it should have put a mechanism in place to tide over these constraints. Further, the workshop is fully equipped with drawing section and efforts should have been made to utilize the available facility. The testing infrastructure should have been created over the years.

2.8.3 Non-monitoring of Defect reports

515 ABW receives reports on manufacturing defects in respect of stores manufactured and issued by them. We however observed that documents related to the defect reports, their monitoring and replacement of defective stores were not maintained by ABW.

In reply MGO stated (May 2016) that it is possible that units/ Wksp /Depots had not raised the defect reports as spares get dissipated in the environment. It was further stated that they would be asked to raise defect reports in future and monitoring mechanism has been put in place at the ABW.

In the absence of any existing mechanism to monitor defects at the 515 ABW, no corrective steps could be taken to avoid recurrence of such defects.

2.9 Non-existence of Cost Accounting system

As per Ministry's Guidelines (March 1994) the cost of overhaul of vehicle and engine was not to exceed 30 *per cent* of the cost of new vehicle/engine. This was to be ensured by MGOs Branch/ DGEME. We noticed that at ABWs cost accounting system was not implemented. Hence cost effectiveness of overhaul process at ABWs could not be verified.

In reply MGO stated (May 2016) that the cost accounting procedure in ABW was introduced in 1995 to calculate cost of overhaul of equipment by taking into account the cost of labour and spares only. However the system was not fully implemented due to its limitation of not being able to consider other elements of cost viz MES assets and allied services being vintage. MGO brought out some of the inadequacies in the cost accounting system viz. no

access to the cost of all the spares provisioned through ordnance and assessment of cost of building.

The reply confirms the fact that Ministry's instructions of cost control are yet to be implemented and in the absence of this, efficiency and economy of ABWs cannot be ascertained. The point assumes significance in light of the fact that the initially assigned targets to the ABWs were with reference to designed capacity and these targets were invariably reduced every year. The designed capacity in turn is worked out with reference to Manpower posted to the ABWs. Since the expenditure on manpower is obligatory and the designed capacity of the ABWs remains underutilized, this is bound to result in increased cost of overhauls**.**

Conclusion:

Inordinate time taken for overhaul, reduction in targets due to lack of adequate spares and delay & non-creation of timely infrastructure for the overhaul had adversely affected the maintenance of the equipment. Consequently, there was a huge backlog of equipment for overhaul impacting the operational preparedness of the Army. The delayed overhaul, compounded by delay in issue of release orders and dispatch of the overhauled equipment to the unit was not desirable as a substantial part of the serviceable life of the equipment was spent in workshop/depots. One of the workshops, whose primary role was to undertake manufacture and indigenization of spares to meet the requirement of overhaul and maintenance of other ABWs and field Army had failed to meet its mandate as considerable delay was noticed in the manufacture/indigenization of spares under "OPI" category.

Quality Index of overhauled equipment was far below the prescribed norm due to poor workmanship and poor quality of material used. Due to lack of critical test facilities and test equipments, overhauled equipment was issued to user units without carrying out mandatory tests.

Recommendations:

1. Ministry should ensure strict implementation of the Maintenance Philosophy and intervention norms formulated at the time of induction of equipment and establish a monitoring & co-ordination mechanism at higher level by involving Department of Defence Production and the AHQ to remove the bottlenecks of timely availability of spares and the repairables.

2. In the absence of a policy on overhaul of Class 'B' vehicles in Army, these vehicles are overhauled by the workshops on case to case basis. Ministry may formulate the overhaul policy for Class 'B' vehicles.

3. Timeframe for issue of release orders by DGOS and dispatch of the overhauled equipment by the Depot should be prescribed.

4. Cost accounting system should be introduced in the workshop to ensure optimum utilization of resources *viz.* man-power, machines and materials and to assess the cost of overhaul.

5. OEM prescribed test facility should be installed at the time of setting up of infrastructure for overhaul. Since the release of T-72 Tanks and BMPs overhauled

by workshops to units without certain vital test such as proof firing and dip testing have serious operational and quality implications, facilities for these testing must be created at the concerned workshops.

6. Quality Index of overhauled BMPs despite improvement during 2015-16 still remains low and needs to be further improved.

Chapter III: Infrastructure and Modernization

3.0 Necessity for Modernization of Infrastructure and Technology

Over the years, there had been changes in the weapons and equipment profile of Army with entry of new technology and state-of-the-art equipment. The ABWs were required to upgrade skills with modernization of infrastructure and technology to keep pace with the technology transition.

3.1 Non-Preparation of Long Range Perspective Plan

As per the ABW Procedure, the HQ BWG, Meerut is required to prepare a Long Range Perspective Plan (PP) covering period of 20 years. The PP forms basis of planning at the ABWs taking into consideration facilities available, manpower, and equipment to be inducted or already inducted in the Army. Further, ABWs are required to prepare modernization plan by incorporating modern technologies and timely replacement of vintage machinery as per PP.

We observed that no PP was prepared by HQ BWG. Absence of long term planning had resulted in slow creation of overhaul facilities leading to backlogs in overhaul of major equipment as discussed in Para 3.2.1 and 3.2.2.

In reply MGO (May 2016) stated that a perspective plan for 15 years was promulgated in October 2010, however, due to changes perceived in the induction and sustenance of the weapon systems, a fresh Perspective Plan for 15 years had been forwarded to MGOs Branch for approval. The reply is contradictory to the response given to audit in October 2015, where in HQ BWG had stated that only repair programme for five years were prepared.

3.2 Inordinate delay in creation of Overhaul facilities

We observed lack of synchronization in creation of overhaul facilities and induction of new equipment. In case of ARV WZT-2 the facility was created at the time of phasing out of equipment from the service whereas for ARV VT-72-B creation of facility was delayed to the extent of 20 years from induction. Though MBT Arjun is due for overhaul from 2020-21 and Tank T-90 from 2018-19 onwards, the agency for overhaul is yet to be nominated. Details of such cases are shown in Table 23 below:

Table-23: Status of overhaul facilities

Equipment	Year of Introduction	Due for overhaul	Overhaul facility created in	Remarks
ARV WZT-2	1981-1988	1996-97	Created in 2009	Facility created only three years prior to the period of de-induction as per equipment management policy.
ARV VT 72 B	1994-2003	2009-10	Not yet created	Consultancy contract for preparation of DPR for Overhaul facility has been completed and submitted for approval to Ministry
ARV WZT-3	2001-2007	2016-17	Not yet created	
Tank T-90	2002-	2018 -19	Not yet created	-
MBT Arjun	2004	2020 -21	Not yet created.	-

3.2.1 Creation of overhaul facility two years prior to completion of de-induction leading to unfruitful expenditure of ₹ 73.43 crore

Mention was made in Para 3.1.5 of Report No.6 of 2005 regarding lack of repair technology/ facility for the ARV WZT-2 (Armoured Recovery Vehicle for Tank T-55) inducted during the period 1981-82 to 1987-88. Ministry, in its Action Taken Note, stated (November 2006) that Transfer of Technology (ToT) for establishing overhaul facility ex-Poland for ARV WZT-2 was under progress since 1998 and overhaul of equipment was scheduled *w.e.f.* 2006-07. Notwithstanding the assurance, we observed that the pilot overhaul of only two ARVs was completed by August 2009 after procurement of required plant, machinery and spares with ToT for the overhaul at a cost of ₹ 73.43 crore**.**

After completion of pilot overhaul**,** 512 ABW overhauled only 22 ARV WZT-2 as of March 2016 against the total strength of 222 indicating tardy progress of overhaul. None of the remaining vehicles could be overhauled during its prescribed life as ARV WZT-2 along with Tank T-55 was likely to be de-inducted by 2018.

In reply MGO stated (May 2016) that the case for overhaul was initiated by 512 ABW in 1998 but was sanctioned by MoD in 2007. It was further stated that overhaul of the balance fleet would get completed by the year 2019-20.

Notwithstanding the reply, the fact remains that OH facility for ARV WZT-2 were created only two years prior to due period for de-induction as per the policy. Thus, creation of facility at a cost of ₹ 73.43 crore under the project was ill planned and the expenditure was unfruitful as by the time the contract for creation of overhaul facility was concluded, the equipment had already exhausted its utility.

3.2.2 Non creation of overhaul facilities for ARV VT-72 B and WZT-3

The ARV VT-72 B is a recovery vehicle for Tank T-72. A total of 156 ARVs were procured from M/s Bharat Heavy Electricals Ltd. (BHEL) and inducted into service during the period 1994-2003. As per maintenance philosophy and intervention norms, 129 vehicles inducted up to 2001 were due for overhaul during 2010-15.

We observed that even after 20 years of the induction of the vehicle, no overhaul facility had been created.

Similarly ARV WZT-3 is a recovery vehicle of latest technology available in Indian Army for Tank T-72. During the years 2001-07, 352 ARV WZT-3 were inducted into service through Bharat Earth Movers Limited (BEML). The equipment were due for overhaul from 2016-17 onwards. However, facility for overhaul has not yet been created.

As stated by MGO, owing to geo-political changes in Czechoslovakia (OEM's Country) during 2001-03, neither OEM nor any other company was ready/capable to overhaul ARV VT-72B. In case of ARV WZT-3, though BEML had signed agreement with the OEM i.e. M/s Bumar, Poland for transfer of technology (ToT) in 1999, it did not undertake the ToT

for maintenance and therefore could not establish infrastructure for overhaul. Only when the OEM (Cenzine, a Polish firm) offered to set up overhaul facility for both the ARVs in 2010, Request for Proposal (RFP) for preparation of Detailed Project Report (DPR) for establishment of overhaul facility for ARV WZT-3 at 512 ABW was issued in November 2011. Consequently MoD, in September 2013, concluded a consultancy contract with the OEM for preparing DPR for establishment of overhaul facility at a cost of ₹ 8.36 crore (US $ 1,356,202). The firm submitted DPR in June 2015, which was under consideration at Army HQ (March 2016).

Thus, even after 20 years of the induction of ARV-VT 72B and 15 years of ARV WZT-3, no overhaul facility could be created. As a result 35 *per cent* of the ARV-VT 72B in the field Army were off road and non-functional for want of critical spares and mission reliability of the remaining fleet was 50 *per cent* only. Further, ARV WZT-3 due for overhaul from 2016-17 onwards would not be overhauled till the facility for the overhaul is created.

3.2.3 Delay in creation of infrastructure for Component Level Repair (CLR) for Tank T-90s

A total of 310 T-90 Tanks were initially imported from Russia through a contract signed with the OEM i.e. M/s Rosoboronexport (ROE) in February 2001 and inducted into service during 2001-05. While finalising the contract, some aspects of maintainability of the equipment could not be formalised. As a result a protocol was signed in September 2000 wherein OEM had confirmed that technical documents for Component Level Repair (CLR) of T-90 would be offered by them through a separate contract, negotiation for which would be conducted in six months after signing the main contract for import of the Tanks. Thus the negotiation for CLR should have commenced in August 2001.

We, however, observed that case for Component Level Repair was initiated only in 2004 and the sanction was accorded by MoD in August 2006 at estimated cost of ₹ 287 crore. Processing of the case was further delayed and the contract was concluded with the OEM in September 2014 at a total cost of ₹ 1896 crore with PDC of October 2017.

We found that the first Medium Repair (MR) of T-90s became due in 2011-12 and 75 Tanks were off-road for want of various assemblies. In reply, MGO stated (May 2016) that contract of 2001 did not stipulate the date by which proposal for CLR was to be submitted by the Russian firm. This had resulted in delay in initiation of CLR project and the cost escalation. As regards unserviceable assemblies held for repairs, it was stated that case for procurement of 310 Medium Repair kits was under progress in MoD. The repair would commence on availability of spares that are scheduled from October 2016.

The reply is not acceptable as the protocol signed in September 2000 had provision for conducting a separate contract for ESP in six months after signing of the main contract. The inordinate delay in finalizing the contract for CLR not only resulted in huge escalation in the cost but also affected the operational preparedness of the Army due to holding of unserviceable equipment.

3.2.4 Lack of facilities for repair/overhaul of MBT Arjun

MBT Arjun was developed by Combat Vehicle Research & Development Establishment (CVRDE) and was manufactured at HVF, Avadi. A total of 124 numbers of Tanks were inducted into the Army from 2004-05 onwards. The Tank is due for overhaul from 2020-21. At the time of induction, 69 *per cent* components were imported. These two agencies (CVRDE and HVF) were responsible for providing the components required to sustain the fleet during its life cycle through indigenization or import. However, owing to the failure of CVRDE in indigenizing the required components, HVF could not supply any spares. In the absence of spare support MBT Arjun was not being operational since 2013. MOD in April 2015 directed that DRDO should make 20 tanks with 90% operationally able by August 2015 and nominated a committee for the same. The committee was also directed to work out an SOP for long term sustenance of Arjun Tank.

Regarding present status on the above, MGO stated (May 2016) that nomination of HVF, Avadi for overhaul had been proposed to MoD in October 2015.

3.3 Non- implementation of Project Tulip even after thirteen years of sanction

MoD in January 2003 sanctioned Project Tulip for establishment of additional facilities at 512 ABW as a nucleus for repairs/overhaul of communication and night vision devices for BMP II/ IIK at a cost of ₹ 22.54 crore. The sanction included procurement of 246 Plant, Machinery and Special Equipment (PMSE) at a cost of ₹ 19.64 crore. Of the sanctioned cost of equipment of ₹ 19.64 Crore, cost of communication and night vision devices was ₹ 2.32 crore and ₹ 8.34 crore respectively.

We noticed that the project was sanctioned without any Probable Date of Completion (PDC). Further, project specific financial powers were not delegated to Commandant, 512 ABW till February 2006 for local purchase and maintenance of PMSE. After delegation of financial powers, Commandant 512 ABW procured 166 PMSE amounting to ₹ 3.85 crore by November 2015. Other PMSE could not be procured due to cost escalation. Audit scrutiny revealed that to keep the procurement within the sanctioned cost of the Project, DGEME in July 2015 approved the deletion of 48 PMSEs sanctioned originally and procurement of 32 PMSE with cost escalation of ₹ 5.99 crore. The deleted PMSEs (originally sanctioned cost ₹ 9.08 crore) also included collimators that are required for the overhaul of vision devices.

In reply, HQ BWG stated (September 2015) that the technical specification of the Collimators could not fructify despite the workshop approaching various agencies. Overhaul of vision devices was now being carried out at Opto-Electronics Factory (OLF) Dehradun as they had accepted the responsibility of overhaul of complete requirement of vision devices of BMP. MGO (May 2016) accepted that all the PMSEs required for overhaul have not been procured so far.

3.4 Non- utilization of proof firing facility worth ₹6.53 crore and issue of overhauled BMPs to units without proof firing

512 ABW had been overhauling BMP II since 2004. One of the most vital quality check of overhauled Armament as per quality assurance agency (DGQA) is adjustment firing which is to be carried out by firing 30mm Canon gun and 7.62 mm Co-axial machine gun. As the ABW did not have this facility, a special work for proof firing was proposed in 2008.

Though, the site selected for the facility of proof firing was in the remote area and did not have MES services for electricity and water, administrative approval for the same did not cater for these essential services. Resultantly, the facility created in November 2013 at a cost of ₹ 6.53 crore, did not have electric and water connection and hence could not be taken over by the ABW (March 2016). Now a separate proposal for catering these services had been initiated (July 2015) and was under process.

Thus overhauled BMP-II/IIKs continued to be issued to the units and formations without test firing. As a result defects/failures in Barrel spring assemblies of 30 MM Gun were reported by the units /formations. In defect investigation, DGQA found (February 2014) defects in 20 cases of guns overhauled by 512 ABW. It was further stated that no such case was noticed in the guns overhauled by Ordnance Factory where this test was being carried out.

In reply MGO accepted (May 2016) that though the proof firing facility was handed over to 512 ABW in April 2014, the same could not be put to use for want of electric and water supply. It was further stated that the collegiate conducted to address issue of failure of barrel spring had not attributed it to lack of proof firing.

3.5 Delays in Modernization of ABWs

As per the 11th Army Plan (2007-2012), all eight ABWs were to be modernized**.** Necessity for modernization of the ABWs was felt as a large portion of technical and administrative infrastructure including plant and machinery was of old vintage and nearing the end of their useful life and technologically inadequate and primitive to sustain newly inducted state-of-the-art weapon systems and equipment. The cost of modernization proposals of five selected ABWs was ₹ 1781.44 crore as indicated in Table 24 below**:**

Table 24: Cost of Modernisation Proposals

Name of the ABW	Value of Proposal (□ in crore)
505 ABW	200.00
509 ABW	458.34
510 ABW	381.01
512 ABW	636.65
515 ABW	105.44
Total	**1781.44**

The proposals of the ABWs were accepted by MGO and consultancy contracts for preparation of DPR in respect of these five ABWs was concluded by IHQ of MoD (Army) between March 2010 and December 2012 at a cost of ₹ 6.51 crore. However, DPR in

respect of 505 and 510 ABW could be completed only in June 2014 and for 512 in June 2015. The DPRs for the remaining two ABWs were submitted by the consultants only in September 2016.

In reply MGO stated (May 2016) that much needed modernization had gained momentum and was likely to be completed by 2021-22.

3.6 Ineffective execution of procurement of PMSEs included in approved Priority Procurement Plan (PPP)

The ABWs initiate proposals for procurement of PMSEs for the repair/overhaul activities, considering necessity arising out of new equipment profile and replacement of vintage machinery. The PMSEs projected by the ABWs are included in Priority Procurement Plan (PPP). We found that during the year 2012-13 to 2014-15, total 226 PMSEs valuing ₹196.09 crore were approved by MGO for inclusion in the PPP. However, the total allotment under Capital and Revenue Heads during the period 2012-15 was only ₹ 6.20 crore. This indicated that the allotment of funds to procure PMSEs was not commensurate with the value of PMSEs included in the approved PPP. We further observed that out of allotted funds only ₹ 2.35 crore i.e. 38 *per cent* were utilized. Out of 226 PMSEs, 192 were pertaining to five ABWs selected in audit, against which only 31 PMSEs were procured**.**

While agreeing to audit observation on non-procurement of PMSE, DGEME stated (August 2015) that non-procurement of the PMSEs would have a bearing on the efficiency of the ABWs as overhauling was being carried out with vintage PMSEs whose replacement are sought in the PPPs. MGO further stated (May 2016) that allotment of fund was adequate and done as per cases in progress. Actual allotment is sought when cases reach financial concurrence stage. It was also stated that all the cases which were listed in PPP would be procured during the current financial year.

3.6.1 Non-replacement of Effluent Treatment Plant (ETP)

512 ABW initiated a proposal (April 2012) for procurement of new ETP for replacement of the existing one that outlived its useful life.The ABW is handling hazardous effluents and chemicals which keep accumulating during the process and need to be neutralized before discharging it into drains, to avoid environmental pollution. We noticed that though replacement of ETP was included in the Priority Procurement Plan (PPP) of the year 2009-10, the same was yet to be procured (March 2016). It was further noticed that the effluent treatment was being carried out manually, which is highly unsafe and an inefficient practice. This industrial waste was being discharged in to the drainage.

In reply, MGO stated (May 2016) that the ETP could not be procured as specifications and budgetary quotes of vendors were different and could not be finalized. It was further stated that after promulgation of new delegation of financial powers the same was included in revenue procurement plan of 2016-17 and would be procured in 2016-17. It is evident from the reply that despite inclusion of the procurement proposal in PPP 2009-10, the specifications of ETP were yet to be finalised.

Conclusion:

No Long Range Perspective Plan for creation of infrastructure for the newly inducted equipment or modernization of the workshops was in place. Failure to plan the setting up of infrastructure at the time of induction of the equipment had resulted in a situation where the facilities were created inordinately late, thus, not only impacting the operational readiness due to delayed overhaul but also leaving the expenditure unfruitful.

Present plant and machinery at ABWs was technologically inadequate and primitive to sustain newly inducted state of the art weapon system and equipment. Proposals to modernize infrastructure at ABWs to achieve up-gradation were pending and in few cases, where it was approved, procurement was not effected either due to lack of funds or non-utilization of funds.

Recommendations:

1. Preparation of Long Range Perspective Plan should be ensured in order to facilitate planning and modernization activities at the nominated ABWs so that the overhaul facilities are ready by the time equipment are due for overhaul.

2. Creation of repair/overhaul facilities should be planned and contracted at the time of induction of the equipment itself so that benefits accrue timely and can be exploited during the entire life cycle of the equipment.

3. Overhaul of vision devices is now being carried out at Opto-Electronics Factory (OLF), Dehradun as they had accepted the responsibility of overhaul of complete requirement of vision devices of BMP. In view of this development, MoD may review the scope and implementation of Project Tulip for establishment of additional facilities at 512 ABW.

4. AHQ should lay out a time bound action plan for modernization of ABWs to overcome the problems due to vintage PMSEs currently in use and also to sustain new generation weapon systems.

5. Ministry should expedite the Component Level Repair (CLR) project for supporting Tank T-90 with repair facilities.

6. As MBT Arjun Tank are due for overhaul from 2020-21, Ministry should explore and expedite indigenous development of components of MBT Arjun and creation of repair and overhaul facilities.

7. Army HQ should expedite operationalisation of shooting gallery at 512 ABW and necessary authorization of ammunition for test firing of overhauled guns.

Chapter-IV: Spares Management

4.0 Introduction

The review on Working of Army Base Workshops, carried out by the C&AG (Report No. 14 of 1992) highlighted the issue on non-exploitation of full capacity of ABWs due to non-availability of repairable and poor backup of spares.

In the Action Taken Note, Ministry stated (August 2000) that various steps had been taken to forecast realistic targets and achieve them by way of Equipment Management Policy (Maintenance Philosophy and Intervention Norms) before induction of equipment. Ministry also suggested holding of annual, half yearly and quarterly meetings to review the spares availability.

Further, comment regarding non-achievement of targets by ABWs, was made in the C&AG report No. 6 of 2005 (Para 3.1). In the Action Taken Note, Ministry accepted (November 2006) that non-availability of spares was the major reason for non-achievement of targets. To overcome the problem of non-availability of spares, various actions such as holding of periodical meetings amongst stake holders, discussions during target fixation meeting and mid-term review meetings, limited local purchases to meet the emergent requirements, wherever engineering standards are met *etc*. were taken by Ministry.

Despite the corrective steps taken by the Ministry through ATNs, non-availability of spares continued which remained a major hindrance in achievement of the overhaul targets. We analyzed the implementation of the spares management measures including provisioning. Our examination of records at DGEME, HQBWG, ABWs and feeding Ordnance Depots revealed the following points:

4.1 Provisioning of spares

The annual review meeting on fixation and revision of targets chaired by MGO decides targets for overhaul by ABWs. Accordingly, DGOS issues Special Provision Review Directive (SPRD) indicating total population of vehicles for maintenance and overhaul in the Army. As per the directives, advance provisioning of spares and materials required for overhaul is the responsibility of feeding depots i.e. CAFVD and CODs. Based on the SPRD, the concerned feeding depots are required to initiate action for provision of spares. This process has to commence five years in advance of the ABWs production year. The feeding depots obtain the required spares from Ordnance factories, PSUs and through trade.

Each Workshop is provided with an Ordnance Store Section (OSS) specifically to co-ordinate and facilitate the timely availability of spares. OSS is responsible for placing demand for spares as per overhaul programme on the feeding depot, in June of each year, i.e. nine months in advance of the production year.

4.1.1 Failure of Ordnance Depots in supply of spares

Our examination of the OSS records at ABWs, during the review period, revealed that the spares demanded were not provided by the Depots to the Workshops in required range[16] and depth.[17] The details of non-availability are summarized in Table 25 below:

Table 25: Non availability of items during the year

Year	512 ABW@			505 ABW#			510 ABW*		
	Types of Items demanded	Types of Items received	Non availability percentage	Types of Items demanded	Types of Items received	Non availability percentage	Types of Items demanded	Types of Items received	Non availability percentage
2010-11	1580	996	37	4894	2757	44	12612	3514	72
2011-12	2565	1942	24	5702	2758	43	9497	3169	67
2012-13	2267	1501	34	3386	1664	50	9380	2649	72
2013-14	2490	2008	19	4541	2080	54	6260	1656	74
2014-15	2741	2060	25	4274	2426	43	9684	3041	69
2015-16	3520	2640	25	8320	4242	49	6992	2701	61

@ Items demanded from CAFVD Kirkee for BMP
 # Items demanded from CAFVD Kirkee for Tank T-72
**Total items demanded from all CODs*

At 512 ABW it can be seen that the percentage non-availability of spares in respect of the total items of BMPs was in the range of 19 to 37 *per cent.* Similarly at 505 ABW and 510 ABW, non-availability percentage ranged between 43 and 54 *per cent* and 61and 74 *per cent* respectively.

We further observed at 512 ABW that some of the production hold up items like crank shaft assembly (as per the overhaul scale, four to be replaced with new for every ten engines overhauled), required for overhaul of UTD 20 Engine remained unavailable since 2012-13 onwards. Non- availability of spares for overhaul of UTD 20 Engines in required range and depth necessitated calling in additional repairable engines by 512 ABW from feeding depots for facilitating rollover. This resulted in accumulation of 100 engines as of March 2016 for overhaul at 512ABW. UTD 20 Engine required for overhaul of BMP vehicles (overhaul scale is 40 engines per 100) were also not received. Thus the workshop had to utilize the overhauled engines instead of new engines.

16 Range of spares- Total type of spares required for overhaul
17 Depth of spares- Quantity of particular spares required.

Similarly, some of the production hold up items at 505 ABW like ERA Box[18], Track Assembly, AS-34 internal communication device, Night sights (TKN-3 and TPN 1-49-23) remained unavailable since 2012-13 onwards in full depth. ERA Box is to protect the Tank from anti-Tank ammunition, Track assembly is the part on which Tank moves whereas night sights provides night vision. Due to continued non-availability of these items, overhaul of the Tanks was carried out with deviation sanctions, affecting the operational efficiency of the Tanks.

Our examination of the records at 509 ABW during the review period revealed that the spares demanded by the workshop were not supplied by COD Agra in complete range and depth. The percentage of non-compliance of spares during the period 2010-11 to 2015-16 in respect of important equipment like Radar, Radio, Line and Optoelectronic equipment was 36 to 52, 61 to 76, 71 to 94 and 64 to 93 respectively. The delay in supply included 72 types of spares which were pending for more than five years.

In reply, MGO stated (May 2016) that low availability of spares was the primary reason for Production holdups and non- delivery of spares by Ordnance Factories/ DPSUs was the main reason for slippages of targets and under performance by the ABWs.

Low compliance of spares on the part of feeding depots due to delay/non supply of spares by OFs/ DPSUs affected the targets of overhauls, leading to huge backlog in overhaul and consequently affecting the availability of equipment to the field Army, thereby reducing operational readiness.

4.1.2 Delay in placement of demands for spares by CAFVD, Kirkee

As per Army HQrs instructions, Demand/ Supply Orders should be placed by Ordnance Depots within two months from the date of provisioning review. In order to examine the provisioning done by the Depots during the review period, 23 critical spares of Tank T-72 and BMPs were examined for sample check.

We observed that in seven cases indents were forwarded to IHQ of MoD for procurement as they were not within the financial powers of the Commandant, CAFVD. In these cases, there was either delay in sanction by the CFA or sanction was not accorded and even in cases of delayed sanction, supply orders were not placed by the CAFVD. In respect of the remaining 16 cases, procurement of the spares was sanctioned by the Commandant, CAFVD and supply orders were placed on private vendors. All these supply orders were cancelled during September 2011 to February 2012 mainly due to failure of the firms to supply the stores. Subsequently, indents for supply of all the 23 items were placed on Ordnance Factories in March 2012. Incidentally, these supply orders were not required to be placed with the private vendors in the first place as MoD guidelines (March 2002)

[18] **ERA box** are provided for protection against anti-tank ammunition, Repaired old track assembly were being fitted post overhaul against new, Non-availability of AS-34 leads to no internal communication and No night vision capability present with the affected Tanks due to absence of Night sights (TKN-3 and TPN 1-49-23)

clearly stipulate that procurement of all the spares in respect of T-72 and BMP were to be met from OEM *i.e*. Ordnance Factories.

In respect of all the selected 23 cases, there were abnormal delays ranging between 725 days and 2551 days in the placement of orders with the OEM.

In reply MGO stated (July 2016) that delay had occurred due to single source of supply/ reduction in scales, procedural delays in obtaining CFA sanction, DGQA inspection issues, cancellation of TPC indents and items not in factory Bill of Material.

The reply is indicative of the fact that the internal delays in the organization are affecting the procurement process. Thus, the very purpose of advance planning of five years to procure spares required for overhaul in order to issue to ABWs at the beginning of production year for overhaul was defeated.

4.1.3 Non-materialization of indents placed on Ordnance Factories

Ordnance Factories (OFs) are the designated supplier of spares being OEM for Tank T-72 and BMP. CAFVD, Kirkee places indents on the respective OFs for the spares of these combat vehicles. The annual targets for supply of spares for the factories are fixed by the MGO after due consultation with all stake holders, including representation from the OFB.We observed that, though the Interim Period[19] (IP) of Ordnance Factories for supply of spares was 36 months, the factories could not supply the spares in adequate range and depth.

Our examination revealed that as of September 2015, 15240 indents placed by CAFVD up to March 2013 were overdue for delivery against nine factories responsible for supply of spares for Class “A” vehicles. As far as supply of spares for BMP, Tank T-72 and the engines for both these vehicles are concerned, supplies against 10499, 1122 and 2749 indents were awaited from HVF Avadi, EF Avadi and OF Medak respectively. These include indents outstanding against EF Avadi since 2002-03 and on HVF since 2003-04.

4.1.4 Non-materialization of indents placed on PSUs

i. Tatra vehicles which are Class B i.e. non combat vehicles used in Indian Army for transportation of Tanks and also as missile launcher, gun-towing tractor, ammunition carrier, medium recovery vehicles, etc. Overhaul of Tatra vehicles are carried out by the ABWs at Meerut and Allahabad. COD, Dehuroad is the feeding depot and M/s BEML, Bengaluru is the designated for supply of all spares and aggregate of Tatra vehicle.

Our examination at COD, Dehu Road revealed that 142 supply orders (997 items) of the period 2008 -14 placed on BEML for supply of spares for Tatra vehicle/engine did not materialize.

[19] Interim Period- It is the period in which the suppliers have to supply the stores.

Further, our examination of records at BEML Bengaluru revealed that 100 *per cent* supply was pending against 795 items and part supplies were made against 25 items. The reasons for non-supply of spares was attributed to non-supply of spares by OEM, non-indigenization of most items of spares ordered for non-euro version of Tatra vehicles and extraneous situation of import embargo on BEML post June 2012.

The above situation was despite the fact that M/s BEML had agreement with the OEM (M/s OMNIPOL) way back in 1986 for indigenous manufacturing of Tatra Vehicles and its spares. Issue of inordinate delay in indigenisation of spares by BEML was highlighted in our earlier report (Para 2.1 of CAG report No. 35 of 2014 Union Government, Defence Services). As stated in the report the indigenisation of the spares did not commence till 2007 and as a result only 4,423 items of spares out of total 10,878 items i.e. 40.66 *per cent* had been indigenised by 2013. Further there was short fall in supply of 1758 items of spares worth ₹ 39.51 crore out of 4078 indigenised items for which orders were placed by COD Dehuroad during 2008-14.

ii. During the period 2010-16, of the total 1152 supply orders valuing ₹ 475.78 crore, placed by COD Agra on M/s BEL for supply of electronic items for equipment like Radar Fly catcher, Radar TC reporter etc.,689 orders (60%) valuing ₹ 323.21crore were pending on M/s BEL as indicated in Table 26 below:

Table-26: Supply orders pending on M/s BEL

Year	SOs Placed	SOs Pending		Value of Pending SOs (₹ in crore)
		Nos.	% of non-material-ization	
2010-11	188	107	57	8.44
2011-12	294	119	40	31.28
2012-13	109	45	41	20.90
2013-14	53	28	53	39.96
2014-15	188	105	56	57.21
2015-16	320	285	89	165.42
Total	**1152**	**689**	**60**	**323.21**

We observed that these pending orders included 72 production hold up items. Non-availability of these production hold up spares therefore affected the overhaul of Radar Flycatcher, BFSR and TC Reporter.

4.2 Non-availability of critical spares leading to deviation sanctions

As per Technical Instruction No. 2 issued (November 2004) by HQ BWG, Deviation sanctions may be initiated by concerned ABW in case of non-availability of components or modification kits, provided these do not adversely affect the operational reliability and performance of the equipment as a whole and do not cause any risk to the life of crew or operator. The issue of deviation sanctions should not be a matter of routine but an exception.

Quality Control Engineers (QCEs) attached to the workshops, who directly function under HQ Base Workshop Group in their remarks would give detailed justification and reasoning, both technical and logistic, while recommending or otherwise, a deviation. Commandants of ABWs are personally responsible for the efficient operation of equipment in respect of which deviation sanctions have been granted. In this regard the following points were noticed at the selected workshops.

505 ABW

The items for which deviations were accorded by MGO, while issuing Tanks T-72 to the Depot/Units due to non-availability of critical spares and assemblies are indicated in Table 27 below:

Table-27: Deviations sanctions accorded at 505 ABW for want of spares

Year	Output of T-72	Items for which deviation accorded						
		Gunner NVD TPN 1-49, NVD TKN-3	ERA Box	AS-34	AS-37	Road Wheel	Track Assy	Gasoline Engine
2010-11	35	35	-	-	-	-	-	-
2011-12	10	09	-	01	-	-	01	-
2012-13	50	06	40	22			43	09
2013-14	30	-	30	15	18	22	06	04
2014-15	40	-	40	-	15	38	13	12
2015-16	40	-	10	-	-	10	10	05

It can be seen that the Tanks were issued to units for use without replacement of vital items like ERA Box, Track Assembly, AS-34, Night vision devices for which deviation was accorded. These were yet to be received in the field which would affect the performance of the Tanks. Given the significance of these important components *i.e.* ERA Box- which protects Tanks from explosive attack; Track Assembly- used for movement of the Tank; AS-34- Communication device and Night vision devices in the overall functioning of the Tank, their issue to the units for operational purpose was fraught with the risk of loss of life and equipment.

512 ABW

We observed from the compiled data of the Deviation sanctions proposed by 512 ABW and accorded by MGO, that all the 398 overhauled BMPs issued to CAFVD during the period (2010-16) under review were sanctioned with deviations. Contrary to the provisions in technical instructions, we observed that deviation sanctions were accorded as a matter of routine and 139 BMPs were issued against recommendation of Quality Control Engineer (QCE), which included 19 BMPs overhauled in 2010-11 and 77 BMPs overhauled in 2013-14 that were declared by QCE as 'not battle worthy' due to non-availability of night vision devices, but were cleared by the MGO despite the recommendations of the QCE.

In reply 512 ABW stated (August 2015) that in absence of spares, the workshop did not have any option but to ask for deviation and hand over the overhaul equipment. It is evident from the reply that operational reliability of the equipment was not being ensured as these vehicles would suffer from night blindness in a war scenario.

In reply to audit observation, MGO stated (May 2016) that deviation sanctions are strictly asked for spares/ assemblies which do not affect the operational reliability of the equipment under any circumstances. It was further stated that in case the deviation sanction affects the operational requirement, the deviation sanction is issued in consultation with Line Directorate and MGOs Branch to utilize that particular equipment till receipt of necessary spares from source of supply.

The reply is not tenable as DGEME with reference to indigenization of assemblies/ sub-assemblies had conveyed (May 2015) their concerns to Directorate of Indigenisation that due to non-availability of spares, the deviation sanctions were invoked to circumvent the problem in the short run and the equipment remained incomplete and the deficient items never got issued to the equipment. Hence it is evident that such equipment, though issued to the units are not fully fit for the operations.

4.3 Non-replacement of defective stores by Ordnance Factories

The feeding depots receive spares from Ordnance Factories under self-certification by QA of the Ordnance Factories which are subjected to inspection by Quality Control (QC) section of ABWs. The QC initiates 'Defect Report' for defective spares and the defects are investigated by CQAs being Authority Holding Sealed Particulars (AHSP). After completion of defect investigation, the CQAs recommend back loading of defective stores to Ordnance Factories/DPSUs for replacement/rectification. We observed that most of the defective stores were replaced by the supplier i.e. M/s BEL. However, the response of the Ordnance Factories in replacing the defective stores was very poor.

- **512 ABW**

CAFVD had back-loaded defective stores worth ₹3.19 crore during the review period to OF Medak for replacement but no replacements were received even after periods ranging from one to five years (October 2015). OF Medak in November 2015 confirmed that no cost adjustment was made for the defective stores and the rejected items would be rectified/ repaired by them.

- **510 ABW**

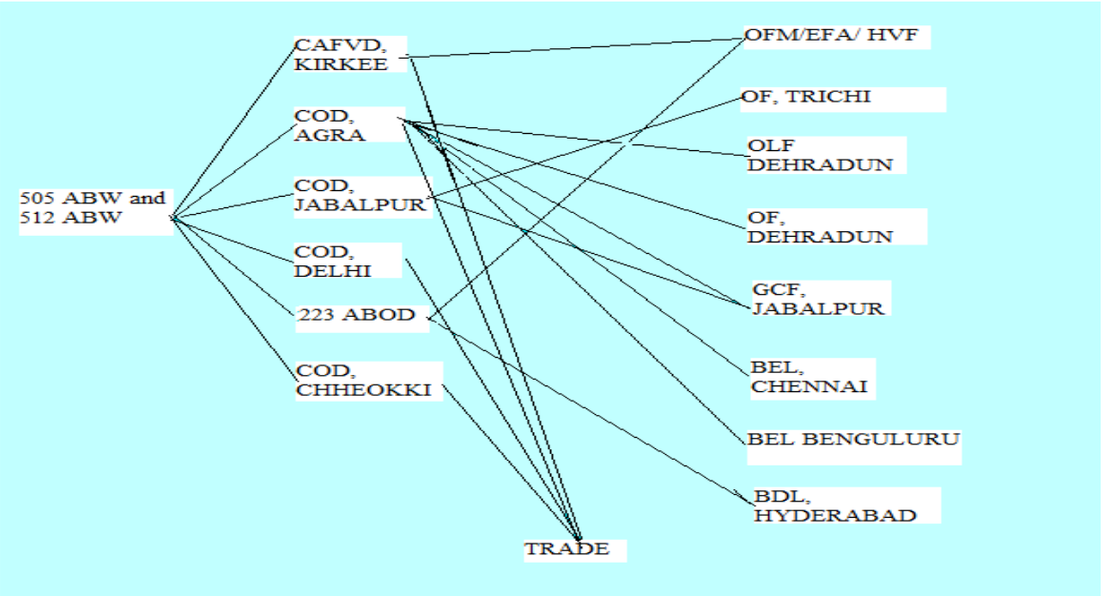
Similarly, 510 ABW raised 173 defect reports during the review period. The defective store was lying at OSS 510 ABW. The defective store was yet to be back loaded to the concerned depots.

Thus, the slow pace of Ordnance Factories in replacing defective stores and delay on the part of 510 ABW to backload the defective stores is a matter of concern as it affects the overhaul activities at ABWs.

4.4 Delay in Implementation of 'System Based Central Depots'

The two major workshops *i.e.* 505 and 512 ABW responsible for overhaul of Class "A" vehicles are dependent on six Central Ordnance Depots for obtaining the spares for the overhaul of respective equipment. Present model for spares supply in existence at the ABWs is shown in Chart-2 below:

Chart- 2: Model for supply of spares.



The dependency on multiple depots for spares support of equipment was a major area of dissatisfaction for the ABWs, as they had to raise multiple demands and correspond with various feeding depots. In order to improve user satisfaction and ensure better equipment management, MGO decided in July 2013 to redistribute the entire ordnance inventory in a phased manner and workout the modalities for implementing 'System Based Central Depots'.

As a pilot project, CAFVD, Kirkee was to be established as a system depot for Tank T-72 and T-90. For this, all central depots were to identfy the exclusive inventory pertaining to T-72 and T-90 Tanks and trasfer the same to CAFVD by December 2013. We, however, observed that the transfer of inventory from COD Agra to CAFVD was completed only in September 2015. Further, CAFVD was yet to place supply order for these spares (March 2016).

In reply DGOS (July 2016) while reiterating that CAFVD must continue to act as the single window for spares management of Tanks T-72 and T-90 did not give specific comment on the delay in implementation of pilot project.

4.5 Lack of coordination between supply and overhaul agency resulting in procurement of unwarranted spares

DGOS is responsible for provisioning of spares and DGEME is responsible for overhaul and maintenance of fleet of Army vehicles. Both these agencies under MGO, are required to work in close co-ordination on spares procurement and management to achieve the goal of timely and satisfactory overhaul. We however observed that lack of co-ordination between these two agencies had resulted in procurement of unwarranted spares as discussed below:

352 ARV WZT-3 were procured by Army in phases between the year 1999 and 2004 and these were being exploited regularly. Over a period of 15 years, wastage pattern of spares has been established.

We observed that for concluding a contract agreement (October 2011) with M/s BEML for supply of 204 ARV WZT-3 at a cost of ₹ 1400.85 crore, the Ordnance Branch was not consulted by EME Branch before finalizing the list of spares to be included in contract under MRLS (Manufacturers recommended list of Spares) in spite of the established wastage pattern. As a result 765 spares where wastage pattern is established were not included in MRLS and 83 items for which no wastage had been established were included. Had the list of MRLS been finalized in consultation with Ordnance Branch, these spares would have been received as a part of contract.

In reply, MGO stated (May 2016) that though the wastage pattern of spares was established, M/s BEML could not supply the spares, hence MRLS was included in the contract.

The reply is not tenable as the stocking agency (DGOS) should have been consulted by DGEME prior to inclusion of MRLS in the contract so that only such stores with established wastage pattern were procured.

Conclusion:

In the Action Taken Note to C&AG report of 2005, Ministry had stated (November 2006) that for spares management, various steps such as holding of quarterly spares review meeting, target fixation and mid-term review meeting, creation of special task force for monitoring overhaul commitments and regular interaction with Ordnance Branch would be taken up. However, the problem of timely availability of spares continued. Non availability of spares in adequate range and depth and in time was the main reason for delay in overhaul and consequent, backlog of equipment for overhaul. The demands for spares were also not placed in time by feeding depots on supply agencies. OEMs though nominated as primary suppliers of spares and single window for particular equipment, also failed as they did not have adequate capacities to meet this obligation.

In the absence of critical spares, the overhauled equipment were issued to units and formations with deviation sanctions. These deficiencies could also not be addressed in the field, thus, affecting the performance of the equipment.

ABWs had complex model of spares supply where spares for equipment were demanded from multiple feeding depots, located at different places. Though, to overcome the problem,

concept of system base central depot was conceived, however the pilot project for creating CAFVD as a single window for spare management for Tank T-72 and T-90 is yet to be implemented.

Recommendations:

1. An integrated IT based spares management system needs to be put in place for timely provisioning, procurement and availability of spares.
2. The System based depots concept introduced by Army need to be implemented on priority.
3. For augmenting availability of spares, constraints in the availability of spare need to be identified and process of making available spares through manufacturing or procurement from trade/OFs need to be streamlined. Reasons for delays in execution of Work Orders at 515 ABW need to be diagnosed and addressed.

New Delhi **(PARAG PRAKASH)**
Dated: 26 December 2016 **Director General of Audit, Defence Services**

Countersigned

New Delhi **(SHASHI KANT SHARMA)**
Dated: 26 December 2016 **Comptroller & Auditor General of India**

List of Abbreviation

ARV	Armoured Recovery Vehicle
ABW	Army Base Workshop
ADG (Proc)	Additional Director General (Procurement)
ADG (EM)	Additional Director General (Equipment Management)
AFV	Armoured Fighting Vehicle
AHQ	Army Head Quarters
AHSP	Authority Holding Sealed Particulars
ATN	Action Taken Note
BDL	Bharat Dynamics Limited
BEL	Bharat Electronics Limited
BEML	Bharat Earth Movers Limited
FSR(MR)	Battle Field Surveillance Radar (Medium Range)
BHEL	Bharat Heavy Electricals Limited
CAFVD	Central Armoured Fighting Vehicle Depot
CASD	Central Aviation Supply Depot
CFA	Competent Financial Authority
CLR	Component Level Repair
COD	Central Ordnance Depot
CQA	Controllerate of Quality Assurance
CVD	Central Vehicle Depot
CVRDE	Combat Vehicle Research Development Establishment
DG Sets	Diesel Generating Sets
DGEME	Director General Electronics and Mechanical Engineering
DGMF	Director General Mechanised Forces
DGOS	Director General Ordnance Services
DGQA	Director General Quality Assurance
DPR	Detailed Project Report
DPSU	Defence Public Sector Undertaking
EFA	Engine Factory Avadi
EME	Electronics and Mechanical Engineering
EMPS	Equipment Management Policy Statement
ERA	Explosive Reactive Armour
ESP	Engineering Support Package
ETP	Effluent Treatment Plant
HAL	Hindustan Aeronautics Ltd
HQ BWG	Headquarters Base Workshop Group
HRV	Heavy Recovery Vehicle

HVF	Heavy Vehicle Factory
ICV	Infantry Combat Vehicle
IHQ	Integrated Head Quarters
IP	Interim Period
IP	Industrial Personnel
IT	Information Technology
LRPP	Long Range Perspective Plan
MBT	Main Battle Tank
MES	Military Engineering Services
MGO	Master General of Ordnance
MISO	Management Information System Organisation
MoD	Ministry of Defence
MR	Medium Repair
MRLS	Manufacturers Recommended List of Spares
MUA	Major Unit Assembly
NBC	Nuclear Biological and Chemical
OD	Ordnance Depot
OEM	Original Equipment Manufacturer
OF	Ordnance Factory
OFB	Ordnance Factory Board
OFM	Ordnance Factory Medak
OH	Overhaul
OLF	Opto Electronics Factory
OPI	Operational Immediate
OSS	Ordnance Store Section
PDC	Probable Date of Completion
PMSE	Plant Machinery Special Equipment
PP	Perspective Planning
PPP	Priority Procurement Plan
PSU	Public Sector Undertaking
PTY	Priority
QA	Quality Assurance
QC	Quality Control
QCE	Quality Control Engineer
QI	Quality Index
RFP	Request for Proposal
RI	Residential Inspector
RO	Release Order
ROE	Rosoboronexport

RUT	Routine
SMT	Special Machine Tools
SOP	Standard Operating Procedure
SPRD	Special Provision Review Directive
STE	Special Test Equipment
TGEME	Technical Group Electronics and Mechanical Engineering
TJ	Tools/Jigs
ToT	Transfer of Technology
WO	Work Orders