The Auditor-General

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Performance Audit

General Service Vehicle Fleet

Department of Defence

Australian National Audit Office

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Australian National
Audit Office

Canberra ACT
24 May 1999

Dear Madam President
Dear Mr Speaker

The Australian National Audit Office has undertaken a performance audit of the Department of Defence in accordance with the authority contained in the *Auditor-General Act 1997.* I present this report of this audit, and the accompanying brochure, to the Parliament. The report is titled *General Service Vehicle Fleet*.

Following its tabling in Parliament, the report will be placed on the Australian National Audit Office's Homepage—http://www.anao.gov.au.

Yours sincerely

P. J. Barrett
Auditor-General

The Honourable the President of the Senate
The Honourable the Speaker of the House of Representatives
Parliament House
Canberra ACT

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Abbreviations/ Glossary

ACVMP	Army Commercial Vehicle Management Program
ADF	Australian Defence Force
ADR	Australian Design Rules
ANAO	Australian National Audit Office
BOP	Basis of Provisioning
CL vehicles	Commercial Line vehicles are purchased ‘off-the-shelf’ for the movement of equipment, supplies and personnel on formed roads
Defence	Department of Defence
DEFMIS	Defence Financial Management Information System
EEV	Equipment Entitlement Variation
EMEMIC	Electrical and Mechanical Engineering Management Information Computer
ERL	Extensive Repair Line
FTE	Full Time Entitlement
GS vehicles	General Service vehicles are designed to move equipment, supplies and personnel with a cross country capability
ILS	Integrated Logistic Support
LE	Loan Entitlement
LOT	Life-of-Type
LOTMIS	Life-of-Type Management Information System
MAS	Maintenance Advisory Service
MLOC	Minimum Level of Capability
Mobility category	Describes the performance characteristics of a particular vehicle
OH&S	Occupational Health and Safety
OLOC	Operational Level of Capability
OTRL	One–Time Repair Limit
PIMIS	Principal Item Management Information System
SDSS	Standard Defence Supply System
SED	Single Entitlement Document
TUG	Trailer User Group

Summary and Recommendations

Convoy of Mack Heavy (8 tonne) Trucks

Summary

Introduction

1. The Australian Defence Force (ADF) has a large fleet of unarmoured, multi-wheel drive vehicles capable of cross country performance. Known as General Service (GS) vehicles, they are used to move equipment, supplies and personnel in a combat support role. GS motor vehicles are developed from commercial vehicles against military specifications.

2. The ADF GS fleet comprises 6350 motor vehicles together with some 3100 trailers and 450 motorcycles. It has an estimated replacement value of over one billion dollars and an annual maintenance cost in excess of $60 million.

3. Of the two Services which operate GS vehicles, Army is the predominant user and the fleet manager of GS vehicles with Air Force operating less than three per cent of the GS fleet. As a result, this audit primarily focussed on the management of Army GS vehicles.

4. The objective of the performance audit was to assess the effectiveness of, and to identify possible areas for improvement in, Defence management of the GS vehicle fleet. The focus of the audit was on the through-life management of the in-service GS fleet, including the determination of vehicle requirements and associated approaches to fleet replacement. The scope of the audit did not, therefore, specifically address the purchasing/acquisition and disposal processes in the life-cycle of the GS vehicle fleet.

5. The report initially details the characteristics of GS vehicles, the establishment of unit vehicle entitlements and basis of provisioning processes, as well as the determination of current and future capability requirements for the GS vehicle and trailer fleets and their procurement history. It then examines the management of in-service vehicles, associated organisation structures, national fleet management processes, management information system requirements, repairs and maintenance, current operating costs and vehicle safety issues.

Overall conclusion

6. The ANAO recognises that Defence is undertaking a range of initiatives in relation to its management of GS vehicles, but there is scope for significant improvement in a number of areas in relation to the in-

service GS fleet. The report highlights issues which include deficiencies in the numbers of vehicles held against unit entitlements, as well as the inaccuracy of data holdings. It also outlines the benefits of assessing unit vehicle needs and adjusting entitlements accordingly; establishing the required loan and repair pool numbers for GS vehicles and trailers; and addressing deficiencies in the trailer fleet.

7. The audit also identified the need to develop a set of objective mobility categories;[1] gather life-of-type management information; complete a GS fleet life-of-type review using through-life costs; undertake a cost-benefit analysis of staged GS fleet replacement; as well as the need to determine the potential for increased usage of commercial vehicles.

8. The report indicates where there is scope to improve the monitoring and coordination of vehicle management activities; to improve fleet management practices; and to facilitate the development of key management information systems. Fleet management processes are heavily dependent on the availability of accurate and timely information but such information is not readily available to Defence fleet managers at this time. In particular, Defence would benefit markedly from improved management information systems for entitlement and asset information, vehicle condition and availability, maintenance and operating costs, vehicle pool utilisation, vehicle configuration status and repair turnaround times.

9. Other areas where scope is identified for improvement include the care and maintenance of equipment, the high maintenance costs of GS vehicles and the need to review the cost-effectiveness of the Extensive Repair Line.[2]

10. The report also highlights specifically the need for a sound cost-benefit analysis prior to undertaking significant modifications to in-service GS fleets; the need for improved accident data; and the need to introduce measures to avoid the overloading of vehicles.

11. Defence agreed to the ANAO recommendations, which are directed towards improving management and accountability, achieving savings in operating costs and greater efficiency and effectiveness. With management information on vehicle operations and costs at its present stage of development, the ANAO was unable to quantify the level of savings.

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1 Mobility categories describe the performance characteristics of vehicles.

2 The Extensive Repair Line was set up to carry out extensive repairs and refurbishment of GS vehicles that might otherwise have been deemed unrepairable.

Key Findings

Unit Vehicle Entitlements (Chapter 2)

12. Army units across Australia have unit entitlements for equipment detailed in a Single Entitlement Document (SED). The process for recording Equipment Entitlement Variations has changed over time. Units are generally more inclined to seek an increase in entitlements arising from a change in tasking or functions than to propose a reduction when tasks or functions are deleted. Consequently, entitlements for the GS fleet have increased significantly since the vehicles were introduced into service. When compared with the approved entitlement, there are inadequate numbers of vehicles for most GS vehicle types. However, the ANAO considers that the present SEDs may overstate the GS vehicle requirements for some Army units, given their current roles and tasking. Consequently, the present shortfall of vehicle assets, when compared with entitlements, does not appear to be an accurate reflection of requirements.

13. The Basis of Provisioning (BOP) represents a theoretical calculation of the stocks required to enable Army to meet designated levels of preparedness. A realistic BOP is critical to Army achieving and managing capability requirements. The ANAO noted that BOP calculations have not always reflected an accurate assessment of the level of stocks required by Army to fulfil its preparedness objectives.

14. The ANAO was unable to identify a clear linkage between variations in personnel and equipment establishments. There do not appear to be procedures in place to ensure that changes in tasks or functions of individual units are automatically reflected in equipment entitlements. Any adjustments to personnel entitlements and to changes in unit tasking should be taken into account in determining unit vehicle entitlements, in a timely manner.

15. Army's GS trailer fleet has substantial deficiencies in numbers when compared with the approved establishment. As well, most trailer variants are between 27 and 40 years old and a range of safety issues have been identified with their use. Actions proposed in 1992 to resolve trailer capability deficiencies have yet to be addressed.

Determination of Vehicle Requirements (Chapter 3)

16. GS vehicles require a high degree of off-road mobility. Mobility encompasses many criteria which, when considered together, describe the performance characteristics of a particular vehicle. The current mobility categories in use by Defence are broadly based and the ANAO

noted recent Defence discussions aimed at improving the related definitions. The ANAO considers there would be merit in the ADF developing a set of standards which allow vehicle mobility to be objectively measured against stated performance criteria.

17. Life-of-Type (LOT) modelling can be used to predict the cost-effective life of a fleet and to assist in analysing various acquisition, upgrade and changeover strategies. At the time of finalising this report, a LOT management information system was under development but, due to competing priorities, it was uncertain as to when it would be implemented. The ANAO strongly supports the need for improved information systems to support vehicle fleet management and LOT decisions, but also considers that Defence should be pursuing other sources of information to enable early decisions to be made on the LOT of existing vehicle fleets. Such information is vital to improved efficiency and effectiveness.

18. Life-Cycle Costing (LCC), a technique for estimating the total cost of ownership of an asset over its lifetime, is a means of assisting decision-making processes such as optimal resource allocation, configuration changes and amendments to maintenance policy. Knowledge about the actual operating costs of in-service equipment is important to ensure the cost-effectiveness of vehicle fleet operations. The ANAO noted that the current limitations on implementing LCC for Defence GS vehicle fleets include the inadequacy of current data holdings, the failure to develop appropriate LCC models and the cost associated with its introduction.

19. Past procurement processes for GS vehicles have involved the purchase of a complete category of vehicles as part of the one contract, with deliveries occurring over a four to five year period. As a general rule, GS vehicles have an estimated life of 15 years. It is possible that the life of the current fleet may be extended to as much as 30 years. As a result of changes in tasks during such a lengthy period it is highly likely that the initial basis of provisioning may no longer be suitable, well before procurement action for fleet replacement is undertaken, and that the cost of maintaining and supporting outdated military models will rise. These factors suggest that there may be quite different cost-benefit outcomes for Defence in either staging the procurement of vehicles over a longer period or adopting a more frequent turnover of the fleets.

20. GS vehicles are designed to provide a unique capability that is not always required for low-readiness units in peace time. Defence trials of commercial vehicles have indicated the potential for major savings in operating costs when compared to those for GS vehicles. Defence should

examine the functions carried out by various units to determine those cases where commercial vehicles, or special variants, could satisfy their requirements, either on a temporary or permanent basis, and amend vehicle entitlements accordingly.

Management of General Service Vehicles (Chapter 4)

21. Defence organisational structures involved with the management of in-service GS vehicles are extensive and spread across a number of different Defence programs and Service Commands. The result is a complex administrative structure in which there is no single organisation responsible for the overall direction and management of the GS fleet. There is scope to improve management structures, to enhance the monitoring and coordination of vehicle management activities and for further integration of vehicle management processes to achieve greater efficiency.

22. The ANAO identified several aspects of fleet management processes that adversely impact on Defence's ability to properly manage the GS fleet, including:

- an absence of readily available information on the condition of fleet assets;
- the need both to identify those elements of the GS fleet which would benefit from vehicle rotation and to implement an ongoing vehicle rotation program;
- the need for improved monitoring of GS vehicle configurations and for more robust controls over local unit modifications; and
- the need to identify the extent to which GS vehicles should be subject to configuration auditing and to implement a systematic configuration audit program in order to maintain safe and operationally effective vehicles.

There may be benefit in Defence contracting-in fleet management expertise to help alleviate some of the problems identified above.

23. The maintenance of accurate and timely management information is critical to the operation of effective fleet management processes. Defence operates a number of different information systems which are used in the management of the GS fleet. Despite the existence of these information systems, GS fleet management suffers from a lack of accurate, timely and readily available management information. Although a range of developments is being put in place to address the latter deficiency, progress has been slow to date.

Repairs and Maintenance (Chapter 5)

24. Maintenance Advisory Service (MAS) inspections of 62 units in 1997 found that only seven per cent of the vehicles inspected were taskworthy. A range of factors was identified by the MAS as contributing to the poor condition of the vehicles, including the failure of inspections to identify the problems, a lack of any follow-up action and the placement of unrealistic workloads on trades staff.

25. Currently, the ADF can identify the costs associated with maintaining its GS vehicle fleet only by manual extraction of data from a range of different systems, a process which is very costly. The ANAO was able to develop only broad indicative estimates of the costs of maintaining the GS fleet, due to the absence of detailed Defence data. The analysis indicated that the cost of maintaining the lightweight and light GS fleets is about three to four times that of commercial four-wheel-drive vehicles, with similar performance characteristics while operating in similar terrain. The cost of maintaining the medium and heavy GS trucks is approximately twice that of broadly equivalent commercial fleets.

26. One factor that may be contributing to the high maintenance costs for GS vehicles is the comparatively low productivity obtained from uniformed mechanics as a result of their involvement in other military duties. There would be benefit in the ADF identifying the minimum number of mechanics required for deployment as well as examining the feasibility of employing contract civilian labour in lieu of the military mechanic positions not so required.

27. As the existing GS fleets age, the cost of spare parts will continue to increase. There is also likely to be delays in obtaining parts and more unplanned maintenance as vehicles wear out. Examples were noted where some Perentie engine components have increased in cost by an average of 468 per cent between 1982 and 1998. Increases of 140 per cent for Unimog and Mack spare parts, in the transition from superseded to new parts, were highlighted in Defence correspondence in 1988. Contract negotiations for spare parts should examine the performance of suppliers, especially in respect of price escalation, and seek to ensure appropriate safeguards to avoid unwarranted price increases.

28. The ANAO examined data on the cost of refurbishing vehicles on the Extensive Repair Line during 1997–98 and concluded that there is a need to examine its cost-effectiveness, given that the average cost of repairs exceeded the cost of new commercial vehicles with similar performance characteristics.

Vehicle Safety (Chapter 6)

29. To minimise injuries in GS vehicle accidents, Defence is considering engineering solutions for rollover protection, personnel restraint systems and engineering modifications, all of which will involve significant cost. Defence should examine the cost-effectiveness of any proposed modifications to the current GS fleet, giving consideration to factors such as increased use of commercial vehicles (appropriately modified if required), amendments to operating procedures and pending decisions on fleet replacement.

30. The ANAO found that units frequently overload their vehicles. Overloading alters the handling and stability of the vehicle and has the potential to cause axle and chassis problems, including premature failure. Exceeding the maximum allowable loading is dangerous, illegal and results in increased maintenance costs. Accordingly, Defence should develop measures to avoid overloading unit vehicles, such as the more extensive policing of load limits.

31. Limitations have been identified in Defence accident reporting databases. To assist in the diagnosis of vehicle failures and trends, Defence should modify the Military Motor Accident Database to include technical inspection data relating to accidents. This would enable diagnosis of technical factors contributing to accidents and trends in vehicle failures and provide a sound basis for preventative action to be taken.

Recommendations

Set out below are the ANAO's recommendations with report paragraph references and an indication of the Defence response. The ANAO considers that Defence should give priority to recommendations 1, 4, 5, 6, 7, 9 and 13, indicated below with an asterisk.

***Recommendation No.1 Para. 2.45**

The ANAO recommends that, to establish an appropriate requirement for GS vehicle fleets, Defence:

a) undertake a zero-based assessment of vehicle needs in all units and adjust Single Entitlement Documents to correspond with the outcome of those assessments;

b) determine the number of vehicles required for loan and repair pools in accordance with the guidance contained in Defence Instruction (Army)—Admin 64–1, Basis of Provisioning and establish a formal record of the authorised numbers; and

c) take account of any adjustments to personnel entitlements and to changes in unit tasking in determining unit vehicle entitlements.

Defence Response: Agreed.

Recommendation No.2 Para. 2.53

The ANAO recommends that, to address the significant deficiencies in the trailer fleet, Defence initiate early action to resolve any safety issues and to remedy the shortfall in requirements.

Defence Response: Agreed.

Recommendation No.3 Para. 3.15

The ANAO recommends that, to better match vehicle capabilities to required tasking and to assist in decision making, Defence develop a set of mobility categories including criteria and parameters that can be objectively measured.

Defence Response: Agreed.

***Recommendation No.4 Para. 3.35**

The ANAO recommends that, to optimise the fleet replacement process, Defence:

a) complete the development of a life-of-type management information system as soon as possible;

b) give priority to completing the life-of-type review and, in conjunction with this, determine the timing of replacement action for each of the GS fleets; and

c) give close consideration to through-life costs and the supportability of the fleets in developing major expenditure proposals and extensions of life-of-type for existing GS vehicle fleets.

Defence Response: Agreed.

***Recommendation No.5 Para. 3.43**

The ANAO recommends that Defence undertake a cost-benefit analysis of the adoption of a staged approach to procurement and replacement of GS motor vehicle fleets, with a view to achieving a greater evening out of production demands on industry and maximising both economic and operational benefits.

Defence Response: Agreed.

***Recommendation No.6 Para. 3.71**

The ANAO recommends that, to ensure that the most cost-effective vehicles are used, Defence examine the functions and tasks carried out by units to determine those areas where commercial vehicles, or particular variants as necessary, could satisfy the requirement, either on a temporary or permanent basis, and amend vehicle entitlements accordingly.

Defence Response: Agreed.

***Recommendation No.7 Para. 4.8**

The ANAO recommends that, to improve the monitoring and coordination of vehicle management activities, Defence identify a central area of the agency to take the leading role in, and be responsible for, coordinating and integrating activities to monitor the adequacy of existing GS vehicle capabilities and to determine the future requirements for GS vehicles.

Defence Response: Agreed.

Recommendation No.8 Para. 4.44

The ANAO recommends that, to improve national fleet management, Defence:

a) identify those elements of the GS vehicle fleets which would benefit from vehicle rotation and implement an ongoing vehicle rotation program;

b) issue an approved Integrated Logistic Support Instruction for each vehicle fleet, as required by Defence Instruction DI(A)Log 1–33;

c) pursue the cost effective development of configuration management software to record the current configuration of key aspects of GS vehicles; and

d) identify the extent to which GS vehicles should be subject to configuration auditing and, where justified, implement a program of systematic configuration audits of the GS fleet.

Defence Response: Agreed.

***Recommendation No.9 Para. 4.57**

The ANAO recommends that, to overcome current deficiencies in vehicle fleet information, Defence identify those enhancements of vehicle management information systems which should be given priority and actively pursue appropriate solutions.

Defence Response: Agreed.

Recommendation No.10 Para. 5.16

The ANAO recommends that, to maximise vehicle serviceability, personal safety and mission achievement and to avoid unnecessary costs, Defence follow-up the implementation of recommendations arising from Maintenance Advisory Service inspections.

Defence Response: Agreed.

Recommendation No.11 Para. 5.35

The ANAO recommends that, to avoid unwarranted expenditure, Defence examine the performance of suppliers, especially in respect of price escalation, in any contract negotiations for the supply of spare parts.

Defence Response: Agreed.

Recommendation No.12 Para. 5.56

The ANAO recommends that, to help avoid unnecessary repair costs and unnecessary delays in vehicle availability, Defence examine the cost-effectiveness of the Extensive Repair Line taking into account factors such as the assessment of its full cost, estimation of the additional life of the vehicles and whether the vehicles being refurbished are actually needed.

Defence Response: Agreed.

***Recommendation No.13 Para. 6.20**

The ANAO recommends that, to make better use of scarce funds, Defence examine the cost-effectiveness of any proposed modifications to the current GS fleet, giving consideration to factors such as increased use of commercial vehicles, amendments to operating procedures and pending decisions on fleet replacement.

Defence Response: Agreed.

Recommendation No.14 Para. 6.40

The ANAO recommends that, to promote safety and avoid unnecessary accidents, Army develop measures to avoid overloading unit vehicles, such as the use of vehicle weigh scales and more extensive policing of load limits.

Defence Response: Agreed.

Recommendation No.15 Para. 6.49

The ANAO recommends that, to assist in the diagnosis of vehicle failures and trends, Defence modify the Military Motor Accident Database to include technical inspection data relating to accidents.

Defence Response: Agreed.

Audit Findings and Conclusions

Land Rover Perentie Lightweight Truck Fitted For Radio

1. Introduction

This chapter outlines the structure of the report, provides a background to the management of the General Service vehicle fleet and details the main vehicle types in use by Defence and the associated vehicle mobility categories. It also outlines the objectives and background to the audit.

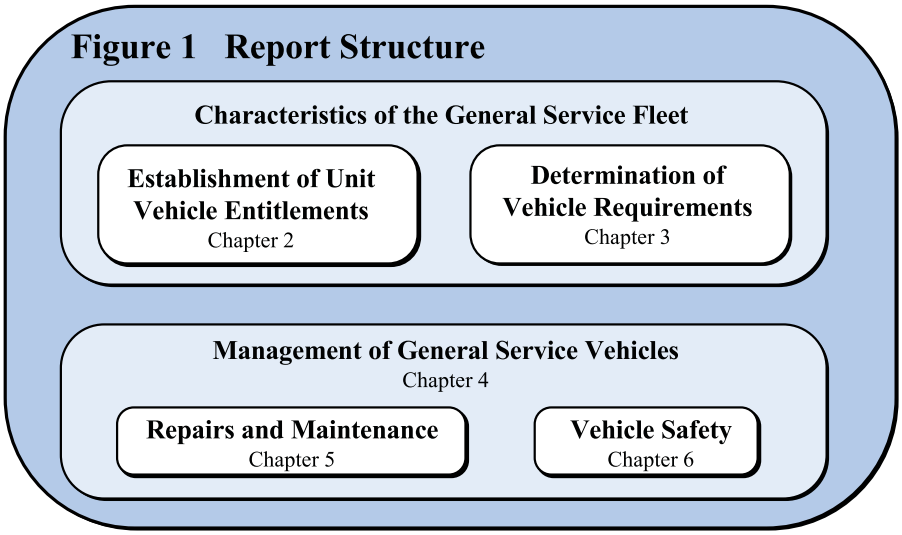
The General Service vehicle fleet

1.1 The Australian Defence Force (ADF) has a large fleet of unarmoured, multi-wheel drive vehicles capable of cross country performance. Known as General Service (GS) vehicles, they are used to move equipment, supplies and personnel in a combat support role. They are therefore essential to Defence operations and to achieving the Defence mission.

1.2 The report initially details the characteristics of GS vehicles, the establishment of unit vehicle entitlements and basis of provisioning processes, as well as the determination of current and future capability requirements for the GS vehicle and trailer fleets and their procurement history. It then examines the management of in-service vehicles, associated organisation structures, national fleet management processes, management information system requirements, repairs and maintenance, current operating costs and vehicle safety issues.

1.3 The audit report is organised into five further chapters as shown in Figure 1. Chapters two and three detail the characteristics of the in-service GS fleet. Chapters four, five and six examine various aspects of the management of GS vehicles.

Figure 1 Report Structure



1.4 Of the two Services which operate GS vehicles, Army is the predominant user and the fleet manager of GS vehicles, with Air Force operating less than three per cent of the GS fleet. As a result, this audit primarily focussed on the management of Army GS vehicles.

Categorisation of vehicles

1.5 The ADF has three main categories of vehicles:

- A Vehicles—Armoured vehicles, either tracked or wheeled, designed to carry armament and from which land force personnel can fight in combat operations because of the protection and cross country mobility they provide.
- B Vehicles—Unarmoured wheeled vehicles used to move equipment, supplies and personnel. They are less suitable to fight from in combat operations because of their vulnerability. They are further categorised as:

  (1) General Service (GS) Vehicles. Vehicles with multi-wheel drive, trailers and motor cycles, which are capable of cross country performance.

  (2) Commercial Line (CL) Vehicles. Vehicles designed for civilian tasks and which are used for the administrative movement of equipment, supplies and personnel.
- C Vehicles—Mobile items of engineer plant and earth moving equipment.

1.6 At the time of the audit the Defence B vehicle fleet comprised approximately 16 300 vehicles (9900 GS, 5500 CL owned and 900 CL leased). The GS fleet included 6350 motor vehicles together with some 3100 trailers and 450 motorcycles. The fleet of GS trailers are categorised by payload as lightweight (0.25–1 tonne), light (1–2 tonne), medium (2–8 tonne) and heavy (over 8 tonne).

1.7 The GS motor vehicle fleet comprises the five major vehicle types as outlined in Table 1.

Table 1:
General Service fleet composition

Vehicle Type	*Number*
Lightweight Truck (Land Rover Perentie 4x4)	2800
Light Truck (Land Rover Perentie 6x6)	720
Medium Truck (4 Tonne Mercedes Unimog)	1840
Heavy Truck (8 Tonne Mack)	902
Prime Mover	88
Total number	**6350**

1.8 The GS fleet has an estimated replacement value of over one billion dollars.

1.9 Defence also classifies its vehicles by four mobility categories:

- Category one (MC1). Vehicles capable of sustained operation cross country but with an acceptable reduction in road performance.
- Category two (MC2). Vehicles capable of sustained operation on roads and tracks with sufficient cross country capability for the deployment of force elements.
- Category three (MC3). Vehicles capable of sustained operation on roads and tracks with sufficient cross country capability to reach echelons[3], supply distribution points and work sites.
- Category four (MC4). Vehicles primarily for use on formed roads with a limited capability to operate on tracks and sufficient off road capability to seek cover from attack or make detours.

1.10 Generally speaking most GS vehicles would be either MC2 or MC3 and commercial vehicles MC4. GS vehicles are developed from commercial vehicles and are built to military specifications. CL vehicles are available "off-the-shelf".

The audit

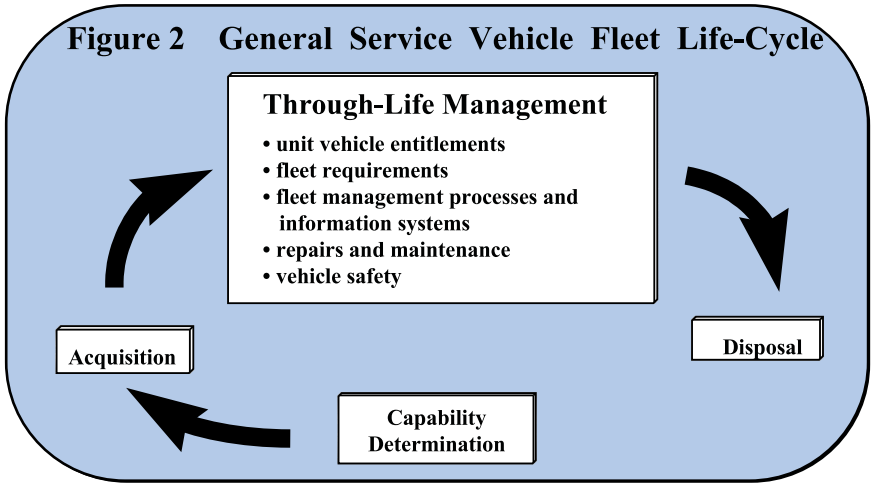
1.11 The objective of the performance audit was to assess the effectiveness of, and to identify possible areas for improvement in, Defence management of the GS vehicle fleet. The focus of the audit was on the through-life management of the in-service GS fleet, including the determination of vehicle requirements and associated approaches to fleet replacement (refer Figure 2). The scope of the audit did not, therefore, specifically address the purchasing/acquisition and disposal processes in the life-cycle of the GS vehicle fleet, nor did it cover 'A' or 'C' type vehicles. The topic has not been addressed in any previous ANAO performance audit.

1.12 The following criteria were used in conducting this audit:

- whether unit entitlements for GS vehicles are accurate and reflect the resources required for current roles and tasking;
- whether GS vehicle requirements are objectively determined with adequate management information;
- whether GS vehicle management activities are well coordinated, effective and undertaken with adequate management information;

[3] Troop concentrations.

- whether GS vehicle repairs and maintenance are undertaken in a cost effective manner; and
- whether GS vehicles are safe to operate and legislative requirements are met.



1.13 Audit fieldwork was conducted substantively in the period from September to December 1998. The audit encompassed fieldwork in the following primary areas of the Department of Defence: the Land Development Branch in Australian Defence Headquarters; Preparedness and Plans—Army in Army Headquarters; Land Headquarters; Headquarters Support Command Australia; Ground and Amphibious Warfare Systems in the Defence Acquisition Organisation and the Defence Personnel Executive. Material on the practices adopted by overseas agencies was also gathered for comparative purposes.

1.14 The audit covered a wide range of activities within Defence and involved extensive discussions and review of documents. Matters were discussed with relevant areas of Defence throughout the audit and they responded in a positive manner to the audit findings. Discussion papers consolidating the findings from the audit were distributed to these areas in December 1998 and January 1999. The exit interview was held in mid February 1999. The proposed report of the audit was put to the Department for any comment in March 1999.

1.15 A consultant, Mr Brian Boland PSM, was engaged to provide expert advice to the audit team and the ANAO appreciates the significant contribution he made to the audit. The audit was conducted in conformance with ANAO auditing standards and cost $325 000.

2. Unit Vehicle Entitlements

This chapter details the unit entitlement and basis of provisioning processes as well as reviewing data on the size and composition of the GS fleet. It highlights significant deficiencies in the numbers of vehicles held against unit entitlements, as well as the inaccuracy of data holdings. It also outlines the benefits of assessing unit vehicle needs and adjusting entitlements accordingly, establishing the required loan and repair pool numbers for vehicles and trailers and addressing deficiencies in the trailer fleet.

Background

Single Entitlement Document

2.1 The numerous Army units across Australia have unit entitlements for equipment detailed in a Single Entitlement Document (SED). This is the authoritative document that details the title, role, organisation, manpower and equipment entitlements listed on the Order of Battle (ORBAT) for the Army. All other materiel entitlement documents relating to unit entitlement are subordinate to, and dependent on, both the SED and the unit's ORBAT status. Section 8 of the Defence Act authorises the Chief of Army to determine establishment levels for manning and equipping the Army. Materiel is not authorised to be issued to a unit until the Chief of Army has approved the raising of the unit and an Army Headquarters instruction and an approved SED have been issued.

2.2 The SED contains four sections as follows:

- Section One—General Unit Information;
- Section Two—Manpower Entitlements;
- Section Three—Principal Item Entitlements; and
- Section Four—Other than Principal Item Entitlements.

2.3 The entitlement of units to GS vehicles is contained in Section Three, Principal Item Entitlements. Principal Items of equipment are items selected by Army Headquarters as requiring intensive management because of their operational importance, high cost or sensitive characteristics. This equipment is central to the role, structure or manpower of a unit. All entitlements for Principal Items are expressed as Stock Item Group Codes (SIGC) or Entitlement Group Codes (EGC). The SED lists the entitlements by SIGC / EGC and a shortened description of the item. The number of items of each piece of equipment is shown in four categories, as follows:

- Operational Level of Capability (OLOC);
- Minimum Level of Operational Capability (MLOC);
- Full Time Entitlement (FTE); and
- Loan Entitlement (LE).

2.4 OLOC is that level of capability at which force elements have the necessary resources, and are sufficiently trained, to deploy and conduct specified operational roles and tasks. MLOC is the minimum level at which force elements can achieve their OLOC within assigned readiness notice. The MLOC entitlement to resources (or liability) is subdivided into FTE and LE. The FTE represents the amount of equipment the unit is entitled to hold on a continuous basis. LE is the unit's entitlement to equipment that is required on a temporary basis. Equipment held in loan pools, to be provided to units when required for training or exercises, is derived from the LE. In the case of units on short-readiness notice the FTE will be at, or close to, the MLOC entitlement. Units with longer readiness notice will hold only a proportion of their MLOC entitlement on a continuous basis and will draw on the loan pools when necessary to carry out specific training or to participate in exercises.

Equipment Entitlement Variation

2.5 The Equipment Entitlement Variation (EEV) process is used to vary a unit's entitlement to equipment. EEVs may be initiated at any level—by Army Headquarters to introduce new equipment into service, by formation or Command Headquarters to address deficiencies or surpluses in subordinate units, or by individual units to address deficiencies or surpluses in their equipment entitlements. Units are generally more inclined to seek an increase in entitlements arising from a change in tasking or functions than to propose a reduction when tasks or functions are deleted.

2.6 Before an EEV is approved, it is subject to close scrutiny at a number of levels within Army, particularly if an increase is sought. This scrutiny will assess the merit of the proposed item and, if appropriate, its impact on operating costs, facilities and other resources. However, the scrutiny is focused on the justification for the proposed variation and does not entail a zero-based examination of the full entitlement of the unit(s). Approval of an EEV results in an amendment of a unit SED. Where it is likely that the EEV will require funding to procure the asset, the availability of funds will need to be determined.

2.7 Different practices have been adopted over time regarding the recording of entitlement variations when appropriate assets were not available. At one time an entitlement variation would not be approved if an asset (eg. vehicle) could not be provided. On other occasions, the

LE rather than the FTE was varied if the asset was not available. In some instances, when GS vehicles are not available, a commercial vehicle has been sought in lieu of the GS vehicle. The establishment records do not always indicate that this is an interim measure pending the availability of a more appropriate vehicle. An entitlement to a Commercial Line vehicle may be recorded in this instance.

2.8 Consequently, the ANAO considers that the present SEDs may overstate the GS vehicle requirements for some Army units given their current roles and tasking. In the past, Army had Establishment Inspection Teams that were designed to visit units at periodic intervals to assess the appropriateness of existing entitlements. These teams were disbanded some years ago and this check no longer exists. It is understood that action is now proposed by Land Headquarters to expand the functions of the triennial audit of units to include a review of equipment/ personnel establishments from a zero-based perspective. This review will re-assess unit entitlements having regard to current roles and tasks.

Basis of Provisioning

2.9 A realistic Basis of Provisioning (BOP) is critical to Army successfully achieving and managing capability requirements. The responsibility for approving the initial BOP rests with the Director-General Preparedness and Plans—Army. When a new item of equipment is introduced the BOP is calculated for each unit. This entails a judgment to assess the number of items of equipment required for the unit to carry out its tasking in order to achieve its OLOC. An assessment is also made of the equipment required for it to achieve its MLOC. The latter forms the basis of a unit's peacetime entitlement contained in the SED for that equipment.

2.10 Defence Instruction (Army)—Admin 64–1 was issued in January 1998 to provide guidance on the determination and through-life monitoring of BOP. The instruction outlined the methodology for calculating MLOC, OLOC, FTE, LE, loan pool entitlement, repair pool entitlement, attrition stocks and reserve stocks.

2.11 The instruction states that calculation of the OLOC and MLOC entitlements requires a judgment to be made on the requirements of units to meet designated levels of capability. Similarly, calculation of the FTE requires a judgment to be made on the needs of units and their ability to maintain equipment. This judgment should be made after consideration of the availability of facilities, test equipment and tools, and staff to crew and maintain the equipment. The instruction does not provide any guidance on the manner in which these judgments are to be made. It would be preferable if it contained clearly specified guidance on the procedures to be employed in reaching these judgments.

2.12 The BOP represents a theoretical calculation of the stocks required to enable Army to meet designated levels of preparedness. Ideally, the BOP should not be influenced by funding constraints but should reflect the total requirement. The ANAO examined the calculation of BOP for a current acquisition project (medium recovery vehicles) and found that the BOP had been adjusted having regard to the availability of funds. In the longer term this will result in an understatement of the requirement to support the Army in the event of a military contingency. The ANAO considers the BOP calculation should reflect an accurate assessment of the level of stocks required by Army to fulfil its preparedness objectives, even if insufficient funds are available to procure the full requirement.

Size and composition of the General Service vehicle fleet

Deficiencies in vehicle numbers

2.13 Army, as the fleet manager, has been aware for some time of a deficiency in GS vehicle numbers compared with the approved establishment entitlement (liability) for all units. The ANAO obtained from Defence the peacetime entitlements and assets, as at July 1998, for the principal GS vehicle and trailer types. A summary of this data is shown in Table 2.

Table 2:
General Service fleet assets and peacetime liability (vehicle numbers)

	Peacetime Liability				*Current Assets*				*Deficiency/ Surplus*	
	FTE	*LC/LR*	*RP*	*Total*	*Units*	*LC/LR*	*RP+*	*Total*	*FTE*	*Total*
Lightweight 4x4	2045	964	548	3557	2011	691	165	2867	-2%	-19%
Light 6x6	677	209	154	1040	559	79	90	728	-17%	-30%
Medium Truck	1622	784	439	2845	1374	408	112	1894	-15%	-33%
Heavy Truck	575	311	164	1050	527	237	139	903	-8%	-14%
Prime Mover	86	13	16	115	79	4	3	86	-8%	-25%
Lightweight Trailer	2225	985	580	3790	1455	412	52	1919	-35%	-49%
Light Trailer	702	321	186	1209	311	42	26	379	-56%	-69%
Medium Trailer	535	201	131	867	361	36	35	432	-33%	-50%
Heavy Trailer	106	27	23	156	163	24	18	205	54%	31%
Semi-trailer	184	22	34	240	179	15	7	201	-3%	-16%
Total	**8757**	**3837**	**2275**	**14 869**	**7019**	**1948**	**647**	**9614**	**-20%**	**-35%**

Source: Defence Records

- LC/LR is the number of vehicles in central and regional loan pools. Liability has been calculated as 60 per cent of the difference between MLOC and FTE.
- RP are repair pools that provide permanent replacements for vehicles undergoing repair.
- RP+ are repair pools plus some other vehicles.

2.14 The table reveals deficiencies in most vehicle and trailer types with only the heavy trailer fleet having a surplus. The most significant deficiencies occur with the medium truck where the shortfall is 951 vehicles (33 per cent) and the light truck 6x6 with a shortfall of 312 (30 per cent). The discrepancies for trailers are even more substantial with a 69 per cent shortfall for light trailers and about 50 per cent for the lightweight and medium trailers.

2.15 For all vehicle types there is a number of variants, eg. cargo with winch, fitted for radio, or fitted for radio with winch. In addition to the apparent shortfall in overall vehicle and trailer numbers, further analysis of the figures shows that even larger discrepancies are occurring with specific variants, within each of the vehicle types. For example, in the medium truck fleet there is a 46 per cent deficit in the cargo trucks with crane and there is a 45 per cent deficit in the lightweight 4x4 truck fleet fitted for radio with winch. In some cases, the shortage in variants is having a marked effect on operational capability. A detailed table showing comparisons of figures for all variants of vehicles and trailers is at Appendix 1**.**

2.16 An examination of vehicle numbers by Brigade indicated that Regular Army Brigades, with a short-readiness notice, generally held most of their FTE. The Deployable Joint Force Headquarters had a small surplus of some types. In discussions with Brigade representatives during audit fieldwork, the ANAO confirmed that most units with a short-readiness notice had adequate numbers of vehicles to carry out all their tasks and functions. However, 7 Task Force, which is an amalgamation of Regular and Reserve units, had a substantial discrepancy of vehicles. All Reserve units were found to be well below their entitlement for all types of vehicles, with consequent implications for unit training and operations.

Use of commercial vehicles

2.17 Some commercial vehicles have been used as an alternative to GS vehicles. Commercial vehicles were managed under the Army Commercial Vehicle Management Program (ACVMP). This function was outsourced to DASFLEET in November 1998. ACVMP was a self-funding arrangement under which expenditure on vehicles, revenue from disposal and expenditure on servicing and repairs formed part of one coordinated program. Replacement criteria for vehicles were designed to achieve a self-funding ratio of about 80 per cent. Army maintains a separate establishment for Commercial Line (CL) vehicles. When a requirement for a new CL vehicle is determined an EEV is raised. This document justifies the requirement and assigns a generic vehicle type.

2.18 Although "off-the-shelf" sedans and wagons form a large part of the fleet a significant proportion are non-standard commercial derivatives modified to suit a specific requirement. There are two categories of commercial vehicles: those that are provided for non-operational land transport and those that are provided in lieu of GS vehicles. However, establishment records do not always distinguish those vehicles provided in lieu of GS vehicles. The largest category of specialist vehicles in the CL fleet are light and medium trucks.

2.19 At June 1998 Defence was leasing about 900 vehicles from the then DASFLEET. The majority of these vehicles were commercial sedans and station wagons but a significant proportion were four-wheel-drive and specialist vehicles that may have been used as substitutes for GS vehicles. The ANAO observed that most of these vehicles were being used on specific Defence projects and not by Army units.

2.20 There does not appear to be any process in Defence to measure the extent to which commercial vehicles are being used to overcome shortages in the GS fleet. The ANAO considers that Defence should introduce procedures to enable the identification of commercial or leased vehicles that have been procured as a substitute for GS vehicles, either on a permanent or temporary basis, in order to more accurately determine the extent to which the GS vehicle entitlement is satisfied.

Reliability of entitlement data

2.21 The ANAO compared entitlement data used by Defence's Support Command Australia National Fleet Managers (NFM) (summarised in Table 2), with the SED records maintained by the Director Establishments—Army. This comparison showed that the entitlement contained in the table compiled by the NFM was overstated in comparison with the SED documents. Establishment data were also contained in two other documents: one prepared by the Directorate of Preparedness and Plans—Army and one prepared in Land Headquarters. In each case the MLOC data differed, in some instances quite significantly.

2.22 The ANAO is aware that the data were collected at slightly different points in time and that this could have resulted in some variation in the approved establishment. However, the difference in excess of 100 for both Perentie 4x4 and Unimog vehicles indicates the need for accurate recording of entitlements. A possible factor underlying the different establishment figures is the number of changes that have occurred in recent years to Defence/ Army programs. These changes have had implications for establishment control.

Entitlement changes since initial procurement

2.23 The ANAO examined Defence documents relating to the introduction into service of the current GS vehicle fleet. These documents indicate that the number of vehicles procured at that time was based on a detailed study of each unit's requirements for all types of GS vehicles. The study involved a review of the requirements of about 350 units.

2.24 The proposed distribution of vehicles to Regular Army elements and Reserve units was equivalent to the FTE entitlement. This was assessed as 1231 Unimog and 458 Mack trucks. The present MLOC or FTE entitlements, as provided by the NFM and Director Establishments—Army respectively, are 1622/1507 for Unimog and 575/569 for Mack Trucks. These figures indicate a growth in FTE of about 32 per cent based on the figures used by the NFM or 22 per cent over the figures from Director Establishments—Army. In the case of Mack trucks the growth has been 26 per cent and 24 per cent respectively.

2.25 The original procurement quantities provided for a loan pool of 419 Unimog and 270 Mack trucks. The current entitlements shown by the NFM are 784 and 311. These figures represent increases of 87 per cent for Unimog and 15 per cent for Mack trucks.

2.26 The initial planning for lightweight and light trucks proposed a total of 3488 vehicles comprising 2968 Perentie 4x4 and 520 Perentie 6x6 trucks. In addition, a capability requirement (contingency reserve) of 232 vehicles was proposed, but this was not approved. At July 1998, the peacetime entitlement for these vehicles was shown as 4597 comprising 3557 Perentie 4x4 vehicles and 1040 Perentie 6x6 vehicles. These figures represent an overall increase in entitlement of about 32 per cent. It is notable that the entitlement for 6x6 trucks has doubled since the original procurement was planned.

2.27 The increase in the entitlement for vehicles since the original procurement is a matter worthy of some examination by Army. Although there has been little increase in the actual number of vehicles, the overall entitlement shown in data provided by the NFM has increased by more than 100 per cent for 6x6 light trucks, 50 per cent for medium trucks, 20 per cent for 4x4 lightweight vehicles and 16 per cent for heavy trucks since the vehicles were purchased. Factors that have possibly contributed to the increasing gap between establishment and vehicle assets are:

- establishment creep arising from approved entitlement variations despite the inability to provide additional vehicles;
- revitalisation increases arising from the initiatives associated with restructuring of the Army;

- a general increase in motorisation within Army units;
- unforeseen project requirements being provided from within existing resources; and
- vehicles being deemed unrepairable as a result of accident damage and an inability to obtain new vehicles from the manufacturer.

Recent assessments of requirements

2.28 A Project Definition Study aimed at assessing all aspects of the ADF's field vehicle and trailer fleet commenced in November 1992 as Phase One of Project Land 121 (identified as Project Overlander). During 1996 a Field Vehicle and Trailer Sizing Study, conducted as part of Project Overlander, sought to estimate the numbers and mix of types of field vehicles and trailers required for tasks that need to be carried out in the Area of Operations and Australian Support Area when there is short warning conflict in northern Australia.

2.29 This study provided a range of estimates of vehicle requirements based on the current force. The outcome of the study was subject to a number of caveats, including reservations concerning the quality of the data and possible changes arising from implementation of the Army in the 21st Century Review. Nevertheless, the Overlander study indicated that with the exception of lightweight vehicles the "best current estimate" of requirements exceeded the current holdings. It indicated a marked shortage of light and medium trucks.

2.30 The paper also referred to another review undertaken in association with the Army in the 21st Century Review that indicated, in April 1996, that a future force structure could require:

- a lesser quantity of lightweight (4x4) vehicles than for the current force structure;
- a similar quantity of medium and heavy vehicles as the current force structure;
- a similar quantity of light trailers; and
- a greater quantity of medium and heavy lift trailers than the present force structure.

Although Army has advised that some of the assumptions underpinning this study are no longer valid, and the results are not necessarily relevant to current circumstances, the ANAO noted that the conclusions are generally consistent with those contained in the Project Overlander study.

2.31 Both the zero-based studies undertaken by Defence in 1996 have had limitations and may not reflect the actual requirements. Nevertheless they support the ANAO view that the present SEDs do not accurately

reflect the real needs of Army units for GS vehicles and that the present shortfall of vehicle assets compared with entitlements is not an accurate reflection of actual requirements.

2.32 The ANAO observed that, at the time of the audit, Army was in the process of developing an Army Equipment Management Plan (AEMP). When fully implemented this plan would entail an annual review of all principal items of equipment. The outcome of the annual review would be submitted to the Chief of Army Staff Advisory Group with recommendations for future action. The ANAO noted that a draft AEMP for the Unimog truck fleet drew attention to the large entitlement/ asset gap and contained a recommendation for a complete review of unit entitlements with a view to verifying the accuracy of this gap.

2.33 The ANAO is aware that Air Force has a fleet of about 150 GS vehicles. It is understood the method of recording establishment entitlements in Air Force differs from the method used by Army. It is considered that the recommended assessment of vehicle needs should encompass all three Services and that, if possible, a common methodology be employed for recording entitlements, particularly as Army is the single Service manager of GS vehicles.

2.34 Also, as a result of the changes in the program structure that occurred in Defence during 1997, vehicles that were previously shown as part of the Army program have now been reallocated to other areas within Defence. Other program areas within Defence do not have the same procedures for establishment control that exist within Army. Consequently, there is no longer a single format for recording the entitlement/ establishment for principal items of equipment, including GS vehicles. Due to the different methods of recording equipment entitlements in other program areas it is difficult to establish with certainty the total entitlement for the vehicle fleet.

Liability for loan and repair pools

2.35 As indicated earlier the SED contains the establishment entitlement for OLOC, MLOC, FTE and LE. Calculation of the loan and repair pools is derived from the authorised establishment. LE is the entitlement for units to draw equipment from loan pools. The purpose of the LE is to ensure that a unit that is unable to hold its full MLOC entitlement is given access to pools of loan equipment to enable it to achieve MLOC. The instruction concerning the basis of provisioning and the submissions relating to the procurement of GS vehicles state that loan pool liabilities should be calculated from the perspective of the demand to be placed on pools, calculated on a regional basis. NFM are responsible for establishing the regional demand pattern, in consultation

with Regional Fleet Managers and all commands whose units have a loan entitlement.

2.36 The ANAO found that this methodology was not being used to determine the loan pool liability. The liability table produced by the NFM has used a figure of 60 per cent to determine the liability in all cases. The ANAO noted that the original procurement documentation for the Unimog and Mack trucks indicated that only 50 per cent of the LE was to be purchased to satisfy the loan pool requirement. This was considered to be enough to allow units to draw sufficient vehicles for annual training camps.

2.37 The BOP Instruction also states that repair pool requirements should be assessed in consultation with the NFM and the then Director of Maintenance Engineering—Army. The repair pool requirement should be periodically reassessed throughout the in-service life of an item of equipment by the NFM to ensure that the liability continues to meet the need. In addition, the instruction states that when more accurate data is not available a figure of 15 per cent of the total operating fleet can be used.

2.38 Although all elements of the GS fleet have now been in service for more than 10 years the ANAO noted that the liability for repair pools had in all cases been calculated as 15 per cent of the operating fleet. It is considered that sufficient time has elapsed for a more accurate assessment of maintenance needs of the various elements of the fleet. The ANAO noted that procurement documentation relating to the Unimog and Mack trucks proposed that the repair pool for the Unimog fleet be set at 9 per cent of the issued stock and for the Mack truck the figure was to be 12 per cent. This represented 148 Unimog trucks and 83 Mack trucks. However, although there has been little increase in the actual assets, the table prepared by the NFM shows a repair pool liability of 439 and 164 respectively for these two types of trucks. Procurement documentation for the Perentie 4x4 and 6x6 vehicles indicated that a figure of 10 per cent was to be used in determining repair pool holdings.

2.39 The assets shown in the comparison table prepared by the NFM indicate that the size of the actual repair pool for the four major vehicle types is 4 per cent for the Perentie 4x4, 7 per cent for the Perentie 6x6, 5 per cent for the Unimog and almost 13 per cent for the Mack. During a field audit visit to the South Queensland Logistic Group in Brisbane the ANAO was informed that a replacement vehicle was generally not provided for vehicles undergoing repair. A replacement vehicle was provided only in special circumstances or when the centre could not repair the vehicle by the date required by the unit. Provided the maintenance

centre is able to complete any necessary repairs by the date nominated by the unit a replacement vehicle is usually not required. The ANAO noted that there were insufficient vehicles in the repair pool in Darwin to provide replacement vehicles.

2.40 The ANAO was advised that Defence is implementing the Defence Integrated Distribution Study and that this could impact on the regional infrastructure and the location and management of loan and repair pools. Having regard to these developments, it is considered that Defence should take early action to examine the appropriateness of the existing entitlements for GS vehicles in loan and repair pools.

2.41 At present the SED contains details of approved numbers required for OLOC, MLOC, FTE and LE. The SED does not contain details of the number of vehicles authorised for loan pools, repair pools, attrition stocks or reserve stocks. Although the latter group is derived from the former there is no formalised system for recording the number of vehicles required to be held in these pools or stockholdings. Consequently there is no formal record of the total number of vehicles required to ensure that Army has the full capability. There would be merit in maintaining a formal record showing the approved number of loan and repair pool vehicles to be held, as well as attrition and reserve stocks. Any variation to these approved numbers should be subject to the scrutiny applied to EEVs.

Linkage between equipment and personnel entitlements

2.42 The ANAO was unable to identify a clear linkage between variations in personnel and equipment establishments. Although the strength of the Army Reserves has remained reasonably constant at about 24 000 members, there has been a substantial reduction in the number of Regular Army personnel with the overall number being reduced from 33 000 in 1992 to a proposed figure of 23 000. Action is in progress to adjust the personnel entitlement to correspond with this reduction. There is no indication that a similar process is in place to reduce equipment entitlements to match these changes.

2.43 Similarly, there do not appear to be procedures in place to ensure that changes in tasks or functions of individual units are automatically reflected in equipment entitlements. In recent years a number of functions previously performed by uniformed personnel have been outsourced to private industry. Where these changes occur it would be appropriate to review the effect of the outsourcing on equipment needs of the units most affected.

2.44 Any adjustments to personnel entitlements and to changes in unit tasking should be taken into account in determining unit vehicle entitlements in a timely manner. In a press release in February 1997 the Minister for Defence announced that the principles and concepts contained in the Army in the 21st Century Review would be used to guide the restructuring of the Australian Army to better meet the Government's strategic posture. To minimise risk, the Government decided to trial and evaluate new concepts using selected formations and units. These trials are still taking place. The ANAO recognises that Army's ability to undertake a zero-based assessment at the present time may be limited because of the ongoing trials relating to the restructuring of the Army, but it is considered that it should be done as soon as possible. In the interim, planning of procedures and methodology could be commenced.

Recommendation No.1

2.45 The ANAO recommends that, to establish an appropriate requirement for GS vehicle fleets, Defence:

a) undertake a zero-based assessment of vehicle needs in all units and adjust Single Entitlement Documents to correspond with the outcome of those assessments;

b) determine the number of vehicles required for loan and repair pools in accordance with the guidance contained in Defence Instruction (Army)—Admin 64–1, Basis of Provisioning and establish a formal record of the authorised numbers; and

c) take account of any adjustments to personnel entitlements and to changes in unit tasking in determining unit vehicle entitlements.

Defence Response

2.46 Agreed. Until the final structure and tasks for the restructured Army are determined and agreed, any attempt to undertake a zero-based assessment will necessarily produce limited results. Ideally, the basis of provisioning should not be influenced by funding constraints but should reflect the total requirement. In the current environment of limited funding this will not always be the case. Additionally, although personnel numbers have been reduced in non-combat areas as a result of administrative efficiencies, there has been an increased emphasis on mobility. It does not necessarily therefore follow that equipment requirements should reduce at a rate commensurate with the overall reduction in personnel.

ANAO Comment

2.47 As it may be some time before the final structure and tasks are determined, the ANAO considers that a zero-based assessment should be undertaken as part of the implementation action flowing from the current trials. The ANAO considers that the basis of provisioning should always reflect the total capability requirement even if funding constraints subsequently impact on the numbers procured so that impact can be assessed and necessary funding priorities established as part of sound resource management.

Trailer fleet

2.48 As mentioned earlier there are substantial deficiencies in the GS trailer fleet. Defence has been aware of the shortage of trailers for some time. During 1991–92 a Trailer User Group (TUG) was established to review the status of in-service trailers, identify equipment deficiencies and future trailer requirements, and determine the potential for rationalising the Army's GS trailer fleet. The TUG report contained the following information:

- the total quantity of trailers was spread among at least seven types and 16 variants;
- most trailer variants were beyond their life-of-type;
- most trailer variants were between 20 and 33 years old (in 1992);
- users were satisfied with the most recent trailers (heavy trailers and semi-trailers) and sought wider application of their successful design principles and high build standards;
- the entitlement for trailers was generally in excess of numbers available, due to under-provisioning and over-estimation of the entitlement, as well as the attrition of older variants; and
- compliance with Australian Design Rules (ADR) was generally poor.

2.49 The TUG report identified a number of deficiencies in the existing endorsed capability document for GS trailers including:

- an unreliable criterion of one trailer per vehicle (unsupported by any capability analysis);
- a low priority on compliance with ADR, particularly for trailer brakes, resulting in unsafe trailers, expensive commercial sourcing arrangements, limited access to commercial and private markets for disposal at the end of their life-of-type and conflict with State road authorities; and
- inadequate trade-offs between military and commercial specifications, resulting in expensive commercial sourcing of trailers and parts.

2.50 The TUG proposed a range of actions to resolve the trailer capability deficiencies. These included:

- reducing the number of trailer variants and minimising specialist trailers to reduce fleet management overhead and life-cycle costs;
- disposing of older trailers that incur high maintenance costs;
- voluntarily complying with ADR, other State and national government regulations to improve safety, design, maintenance, sourcing and disposal, provided that the necessary military capabilities were not prejudiced;
- determine the trailer entitlement (and consequently the asset shortfalls) using a more reliable criterion than one trailer per towing vehicle;
- building brakes into lightweight and light trailers as required by ADR;
- designing trailer wheelbase widths to match the wheelbase width of their towing vehicle to eliminate unsafe tracking of trailers;
- providing the same wheels and tyres for lightweight and light trailers as their towing vehicles; and
- providing the combat equipment stores for lightweight and light trailers that are compatible with the towing vehicle.

2.51 The TUG included recommendations with priorities for action that were to be implemented by the (then) Force Development (Land) Branch. Priority was to be given to resolving significant deficiencies with heavy trailers and lightweight and light trailers. Fleet replacements were to be deferred as much as possible until the Project Overlander project definition study determined the future of the field vehicles and trailer capability in mid-1995.

2.52 The submission arising from the report of Phase One of Project Overlander (completed in 1997) did not seek any variation in the trailer fleet and did not make any reference to the TUG report. The ANAO analysis of entitlements and assets shown earlier indicates that the current shortfall in trailers is at least as great as that reported by the TUG when their recommendation for urgent attention to shortfalls in the trailer fleet was accepted. It does not appear that any action has been taken to address the safety issues raised by the TUG. The ANAO is aware that new lightweight trailers are being introduced at the present time but these are aimed at providing trailers for special projects and do not address overall trailer needs. If these vehicles prove to be satisfactory, the contract allows for them to be considered for possible replacement of the current lightweight fleet.

Recommendation No.2

2.53 The ANAO recommends that, to address the significant deficiencies in the trailer fleet, Defence initiate early action to resolve any safety issues and to remedy the shortfall in requirements.

Defence Response

2.54 Agreed. The safety issue will be addressed in the short term through a policy directive that vehicles and trailers are not to be overloaded. The trailer deficiencies will be addressed through the B vehicle life-of-type review currently being undertaken. It would also seem appropriate to re-determine the trailer requirements based on likely future tasks in the same way as for vehicles.

ANAO Comment

2.55 As policy directives have not always been successful in achieving desired outcomes, the ANAO considers that the directive should be supplemented through the more extensive policing of load limits (see Recommendation No. 14).

Land Rover Perentie Light Truck Command Post with Trailer

3. Determination of Vehicle Requirements

This chapter discusses the ADF's current and future capability requirements for GS vehicles and trailers, the characteristics of GS vehicles and their procurement history. It highlights the need to develop a set of objective mobility categories; gather life-of-type management information; complete a GS fleet life-of-type review using through-life costs; undertake a cost-benefit analysis of staged GS fleet replacement; as well as determine the potential for increased usage of commercial vehicles.

Project Overlander

3.1 As noted in Chapter 2, in November 1992 a project definition study was endorsed as part of a phased approach to examine the ADF's current and future capability requirements for the GS fleet (referred to as Field Vehicles and Trailers in the study). The study was part of a project titled Land 121—ADF Field Vehicles and Trailers. It is commonly known as Project Overlander.

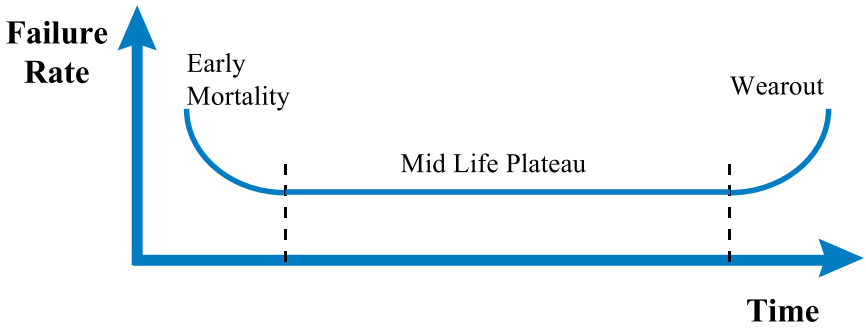
3.2 The outcome of Phase One of the project definition study was that the GS fleet was judged to be in relatively good condition. In August 1997 a submission was prepared seeking approval for the next phase of the project. The submission sought to address only those immediate needs impacting directly on maintaining the ADF's current GS capability through a life-of-type extension for some of the fleet, interim procurement of vehicles and equipment to meet shortfalls in capability and a modernisation program through enhancements to the existing fleet. The collection and analysis of fleet data from a proposed Life-of-Type Management Information System (LOTMIS) would provide data for a later phase of the project to either replace or further extend the life of the remainder of the fleet.

3.3 As part of Phase One an engineering analysis of the GS fleet conducted by the Maintenance Engineering Agency in 1996–97 (using 1993–95 data) indicated that:

- no significant failure trends in major component groups were evident;
- overall, the GS fleets had entered the "mid life" phase of life-of-type (LOT), as illustrated in Figure 3;
- the GS fleets, based on current usage profiles, were unlikely to achieve "wear out" of the major vehicle systems in the next 10 years; and

- an investment was required on some of the current GS fleet in order to optimise the return on the existing investment and to enhance the capability.

Figure 3:
The 'bathtub curve' of vehicle failure rates



3.4 As a consequence of this analysis it was proposed that the initial LOT estimate should be extended by about 10 years for each fleet type. Based on the dates shown in the report this would have extended the LOT for Perentie 4x4 and 6x6 vehicles to 2007–18 with the major part of the fleet reaching LOT before 2012. It was proposed that the Unimog and Mack trucks would remain in service until at least 2012.

3.5 The Maintenance Engineering Agency analysis did not cover the trailer fleet but the proposal estimated that this fleet could continue in service for a further 10 years.

3.6 In order to obtain maximum value out of the existing platforms the Project Overlander report focused on the immediate needs impacting directly on maintaining the ADF's current GS capability. It was not expected that a decision on a major procurement of new vehicles would be required until 2005–06.

Fleet changes proposed by Project Overlander

3.7 In 1992 Project Overlander estimated that the replacement cost of all GS vehicles and trailers could be as high as $1.4 billion. It proposed a range of options with investments ranging from $60–100 million to maintain and enhance the ADF's current GS fleet. Although the Project Overlander report indicated that the fleet was in relatively good condition, a major component of the proposed investment was the upgrade of about 25 per cent of the medium and heavy truck fleet (some 700 vehicles). These vehicles were considered to be in poor condition due to rust and heavy in-service use. It was proposed that an initial investment of $44.2 million to refurbish and upgrade these vehicles would be the first step in extending the LOT of the fleet.

3.8 The proposal was considered by the Defence Capability Committee in 1997 and the refurbishing of some 450 medium trucks at a cost of $28.4 million was supported. However, the proposal was not considered to have a high priority and funds were not provided. The proposal was supported again in 1998 but a decision on funding was not available at the time of writing this report.

3.9 The project report also addressed immediate shortfalls in capability. These included the need to replace six existing bulk liquid fuel tankers. The existing vehicles had been found to have a high maintenance dependency and significant structural deficiencies. The existing off-road recovery capability was identified as deficient and it was proposed that this capability required urgent upgrade. A heavy lift capability was also seen as a high priority. The cost of these proposals was estimated to be $28.5 million. Other modernisation proposals with OH&S benefits were expected to cost $20.8 million.

Characteristics of General Service vehicles

3.10 GS vehicles are generally an adaptation of commercial vehicles to meet military operational requirements, suitably modified to achieve levels of performance higher than, or performance characteristics not found in, commercial vehicles. Among many of their roles, GS vehicles are expected to provide a resupply role to forward lines. In doing so they need to have a high degree of off-road mobility yet provide good on-road performance. They are normally associated with mobility category MC2 or MC3 given the difficult terrain in which they are expected to operate.

3.11 Some important factors which are included in military specifications but are either not available or not designed for commercial vehicles include:

- the capability to conduct daily vehicle maintenance, drive the vehicle and change a wheel while wearing protective clothing for nuclear, biological and chemical warfare (some switches and tools would require modification to provide these capabilities);
- stringent standards for paint specifications;
- amphibious operations (including severe salt water tolerance for transport on ships);
- air transportability (special chassis designed to accommodate very high point loads);
- radio frequency interference suppression to facilitate the operation of electronic equipment;

- documentation, including control of repair parts throughout the life-of-type;
- interoperability with other in-Service equipment; and
- latent defect warranty.

3.12 Mobility broadly encompasses many criteria which, when considered together, describe the performance characteristics of a particular vehicle. It is difficult to identify an all-encompassing definition or performance specification which, when applied to a vehicle, can be used as a definitive measure of mobility. There have recently been discussions within Defence aimed at improving the definition of the present, broadly based mobility categories. The concept of mobility category ratings has been canvassed. This recognises that travelling long distances off-road requires no greater mobility capability than travelling short distances, rather greater durability is more relevant. In addition, mission criticality should have an effect on the ratings.

3.13 The ANAO obtained details of the five mobility categories used by the United Kingdom Ministry of Defence: Low Mobility, Improved Low Mobility, Medium Mobility, Improved Medium Mobility and High Mobility. An extract of the UK Defence Standard is at Appendix 2. The standard sets out the criteria used (for example, ground clearance, stability, fording depth) to classify vehicles into these categories. The key point is that vehicle mobility must be objectively measurable against stated performance criteria.

3.14 The ANAO considers there would be merit in the ADF developing a similar set of standards. Such an approach would be of benefit not only to manufacturers seeking to provide vehicles, but to ADF personnel in determining the precise level of mobility required to carry out allocated tasks and functions. It was observed in the Overlander sizing study that there was some confusion regarding the matching of various mobility categories to the tasking required.

Recommendation No.3

3.15 The ANAO recommends that, to better match vehicle capabilities to required tasking and to assist in decision making, Defence develop a set of mobility categories including criteria and parameters that can be objectively measured.

Defence Response

3.16 Agreed. It is acknowledged that the current mobility classification system does not objectively describe the performance required from ADF field vehicles. Given that the project Land 121 (ADF Field Vehicles and

Trailers) will address current and future capability requirements, it is proposed that this issue be considered by that project.

Timing of replacement action

Life of existing GS vehicle fleets

3.17 The present GS vehicle fleets have been in service for varying periods. Table 3 outlines the dates when the various types of vehicle and trailers were introduced into service and their planned life in years.

Table 3:
General Service vehicle fleets planned life

Vehicle	*Delivery Date*	*Planned Life (years)*
Lightweight 4x4	1987–1998	10
Light 6x6	1987–1998	10
Medium Truck	1982–1991	15
Heavy Truck	1982–1986	15
Heavy Prime Mover	1987	10
Lightweight Trailer	1959–1971	10–12
Light Trailer	1959–1978	15
Medium Trailer	1967–1989	15
Heavy Trailer	1968–1988	15–20
Cargo Trailer	1988	10

3.18 There is considerable variation in Defence documents concerning the date of introduction and the initial LOT of vehicles and trailers. The ANAO noted various documents where the LOT for Unimog and Mack trucks was shown as 10, 15 and 20 years. Where possible, the ANAO has referred to the original documentation but in other instances has used the earliest available source material to determine the dates shown above.

3.19 The table shows that almost all categories of vehicles have reached, or are approaching, their initial planned LOT. The majority of lightweight and light trailers are well beyond their LOT, whereas most of the heavier trailers are generally within the planned LOT.

3.20 The ANAO noted that, in February 1998, the Director of Materiel Policy—Army advised that there had been no LOT extension of GS vehicle fleets. The advice concluded that management of the fleets should be based on the year 2005 until a LOT review had been conducted and an accurate LOT decision made on each of the GS vehicle and trailer fleets.

Life-of-Type management information

3.21 LOT modelling can be used to predict the cost-effective life of a fleet and to assist in analysing various acquisition, upgrade and changeover strategies. As part of Project Overlander, an analysis was undertaken of current LOT management practices in Defence with the conclusion that a comprehensive set of fleet and operational data by Army Registration Number was not available to support LOT modelling and analysis. The recommendation of the study was that, with suitable data collection policies and practices, LOT modelling would be feasible using life-cycle costing methodologies such as through-life costing or econometric modelling. This would involve capture of maintenance and spares cost information at the vehicle level over time and would provide suitable historical data on which future costs could be forecast or modelled.

3.22 The final result of the study was a specification for a LOT modelling system which was considered to meet identified business requirements and which would remain viable for the longer term. Its use in supporting fleet management decisions was considered to represent a major step forward, particularly in enabling fleet managers to prepare analytically supported proposals affecting whole fleets, or segments thereof. The study concluded that, although the use of such models was not wide-spread, certainly within Defence, external experience with LOT models indicated that the investment in developing and using a suitable one was justified through the ability to better manage vehicle fleets.

3.23 Life-Cycle Costing (LCC) is a technique for estimating the total cost of ownership of an asset over its lifetime.[4] It can therefore be a key means of assisting decision-making processes such as resource allocation as well as the management of the in-service vehicle fleets. It facilitates decision-making on issues such as configuration changes and amendments to maintenance policy by highlighting the cost implications. Knowledge about the actual operating costs of in-service equipment is important to ensure the cost-effectiveness of vehicle fleet operations. A comprehensive database would allow tracking of trends in costs as they vary over the life of the vehicles. Good data is essential to achieving accurate life-cycle cost estimates. The ANAO noted that the current limitations on implementing LCC for Defence GS vehicle fleets include the inadequacy of current data holdings, the failure to develop appropriate LCC models and the cost associated with its introduction.

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[4] LCC was the topic of ANAO Performance Audit Report No. 43 1997-98, *Life-cycle Costing in the Department of Defence*.

3.24 Project Overlander has resulted in funding for a Life-of-Type Management Information System (LOTMIS). When this system is implemented it will enable the cost of operating the vehicle fleet to be captured, provide base predictive assessment information to support decisions regarding fleet upgrade or replacement, and provide fleet managers with key information to undertake routine fleet management tasks. However, it will take time for sufficient data to be accumulated to enable 'trends' to be established and for fleet 'condition' information to become available. The confidence level of predictive assessments will become greater over time.

3.25 At the time of audit the LOTMIS system was still under development and, due to competing priorities, it is uncertain when it will be implemented. The ANAO considers that, even when this system is introduced, it will be some time before sufficient data are available to make an informed decision on LOT. The ANAO strongly supports the need for improved information systems to support vehicle fleet management and life-of-type decisions. However, in view of the delay in obtaining adequate data from LOTMIS, it is considered that Defence should be pursuing other sources of information to enable early decisions to be made on the LOT of existing vehicle fleets. Such information is vital to improved efficiency and effectiveness.

Procurement history of existing GS fleets

3.26 The ANAO examined the procurement history of the existing GS vehicles. This history is summarised below:

Medium and heavy trucks

3.27 The Army staff requirement for medium (including heavy) trucks was approved in July 1976. At that time it was stated that the existing trucks would start to reach the end of their economic life in 1979–80. The initial procurement of four tonne and eight tonne trucks was approved in 1980–81 and the first vehicles were delivered in 1982.

Lightweight 4x4 and light 6x6 vehicles

3.28 A staff requirement to replace Army's existing range of light field vehicles was developed in 1980. This requirement was considered by the Defence Operational Requirements Committee in February 1981. A request for tender was issued in May 1982 and the source selection approved in May 1983. Trials were conducted in 1984–85 and a contract signed in 1986 with the first vehicles being delivered in 1987.

Medium recovery vehicles

3.29 In May 1988 Army developed a staff requirement for a medium recovery vehicle to provide a medium and light recovery capability for

Unimog and Perentie vehicles as well as for Army's range of light and medium Commercial Line (CL) vehicles. The existing medium recovery vehicle was at the end of its economic life and was to be phased out by 1993. This requirement was subsequently approved as Phase Four of the project to procure the Unimog and Mack trucks.

3.30 The Force Structure Policy and Programming Committee considered a Major Capability Submission in December 1991 and endorsed the requirement and the funding for 55 medium recovery vehicles. In November 1992, the Defence Source Definition Committee was asked to endorse the equipment acquisition strategy. In that submission the Army advised that the existing recovery equipment was not economically supportable beyond 1995. Procurement action was under way at the time of the audit, but the medium recovery vehicle had still not entered service by the end of 1998.

Trailer fleets

3.31 The Trailer User Group Report recommended that action be taken to complete the outstanding action for urgently needed variants of lightweight trailers. In June 1992, in response to the Report, the Force Development (Land) Branch advised that priority would be given during the next two years to resolving urgent deficiencies with lightweight and light trailers. At the time of audit, procurement action for these trailers had not been completed.

Conclusion

3.32 The history of the existing vehicle fleets shows that it is likely to take at least six years from identification of a requirement for replacement vehicles until introduction into service of the first of the new vehicles. If past history is any guide, development work on replacements for at least some of the GS fleet should now be commencing, even if the LOT is extended as proposed in the Project Overlander report. If action is not taken in the near future Defence is almost certain to experience a severe deficiency in vehicles by the time the replacement comes into service, together with a considerable increase in maintenance costs to keep the remainder of the fleet serviceable.

Proposed expenditure on existing fleet

3.33 At the time of the audit Defence was considering proposals for expenditure in the vicinity of $70–80 million to rectify OH&S concerns with GS vehicles. Similarly Project Overlander sought expenditure of $60–100 million, including $40 million to upgrade 20–25 per cent of the existing medium and heavy truck fleets. The report did not address the action likely to be required in the future for the remainder of these fleets.

There was little reference in these documents to life-cycle costs of the vehicles or to their supportability over an extended period of time.

3.34 The ANAO observed that the Overlander documentation proposing an extension of the LOT did not draw attention to the existing cost of operating the vehicles or difficulties that could arise with the supply and cost of spare parts, especially if the life of the vehicles was extended until 2017 as is proposed in some cases. It is considered that, in reaching decisions on LOT and further capital expenditure on the existing fleet, Defence should examine the through-life costs and the supportability of the equipment. The ANAO acknowledges that the absence of accurate information on costs is a significant limitation but there is a compelling case to address these issues.

Recommendation No.4

3.35 The ANAO recommends that, to optimise the fleet replacement process, Defence:

a) complete the development of a life-of-type management information system as soon as possible;

b) give priority to completing the life-of-type review and, in conjunction with this, determine the timing of replacement action for each of the GS fleets; and

c) give close consideration to through-life costs and the supportability of the fleets in developing major expenditure proposals and extensions of life-of-type for existing GS vehicle fleets.

Defence Response

3.36 Agreed.

Method of procurement

3.37 A major difficulty with the present procurement process for GS vehicles is that, in the past, a complete fleet of each category of vehicle has been purchased as part of the one contract with deliveries occurring over a four to five year period. As a general rule, GS vehicles have an estimated life of 15 years. In the case of the present fleet, it is possible that the life will be extended to as much as 30 years. As a result of changes in tasks and functions during such a lengthy period and the introduction of new equipment requiring vehicle support, it is highly likely that the initial basis of provisioning may no longer be suitable, well before procurement action for fleet replacement action is undertaken. Experience with the present fleets has shown that purchase of additional vehicles incurs a significant cost premium. Factors contributing to this

premium are the extra costs of small production runs and the difficulty of obtaining components as fleets age.

3.38 The existing practice of procuring GS vehicle and trailer fleets at 10 to 15 year intervals has inherent difficulties. In a dynamic environment it is inevitable that tasks and functions, and consequently vehicle needs, will change over time. Given the technological developments impacting on vehicle design it is likely that manufacturers will be introducing new models with different components and spare parts during the life of the military vehicles. As a result, the cost of maintaining and supporting outdated military models will rise. These factors suggest that there may be quite different cost-benefit outcomes for Defence in either staging the procurement of vehicles over a longer period or adopting a more frequent turnover of the fleets.

3.39 The endorsed acquisition strategy for the medium recovery vehicle in October 1992 commented on commonality issues if Mercedes Benz Australia, the supplier of the Unimog trucks, were to be selected. The document stated that the Unimog likely to be offered as a medium recovery vehicle would be two generations after the Unimog used by the Australian Army. It was estimated that commonality with the existing Army vehicle would be no more than 50 per cent. As the Unimog had only been introduced into Defence service between 1982 and 1987, this case illustrates the rapid changes that can occur in vehicle design.

Minister's comments on vehicle numbers

3.40 In a speech to a meeting of the Australia-British Chamber of Commerce in May 1997, the Minister for Defence said "more work is needed to see if we can order equipment in such a way as to present a more predictable and constant level of demand. That contrasts with the past record where we may order hundreds of vehicles in one year, but then nothing for five or 10 years after that. I will ask my Department to study this issue—particularly as it relates to vehicle orders—to see if a smarter approach can be developed."

3.41 In response to a request from the ANAO concerning the measures taken following the Minister's speech the Inspector-General advised that Defence had done three things:

a) decided to pursue a sole-source solution for the purchase of further ASLAVs[5] which promotes continuity of work by Australian defence industry. Demand for new vehicles has been brought forward (although principally for budget reasons);

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[5] ASLAV – Australian Light Armoured Vehicle.

b) declared that it would pursue a sole source solution for the upgrade of the ADF's M113s.[6] Defence has adjusted the timing of its upgrade plans to mesh with the maintenance cycle established for the upgrade; and

c) declared its broad position on demand management in the Defence and Industry—Strategic Policy Statement. That statement notes that Defence will adjust demand where it is sensible to do so, but stresses that the principal solution for continuity of demand lies with the defence industry's broadening of its customer base.

3.42 It appears from this response that there has not been a significant change in the approach to the procurement of motor vehicles by Defence. The ANAO considers that motor vehicles would seem to offer a better opportunity for staged procurement than many other equipments used by Defence. Frequent vehicle developments and model updates in the commercial market indicate scope for economic and operational benefits in Defence by a regular turnover of the GS motor vehicle fleets. A more frequent turnover of vehicles holds the potential for improved resale values and a reduction in overall expenditure. The availability of widespread commercial vehicle dealer networks to support a more modern fleet could also reduce demand on Defence maintenance resources and stockholdings. Another option would be to examine the potential for leasing or buy back arrangements. Such consideration should be based on a robust analysis of the costs and benefits involved.

Recommendation No.5

3.43 The ANAO recommends that Defence undertake a cost-benefit analysis of the adoption of a staged approach to procurement and replacement of GS motor vehicle fleets, with a view to achieving a greater evening out of production demands on industry and maximising both economic and operational benefits.

Defence Response

3.44 Agreed.

Commercial vehicles in lieu of General Service vehicles

3.45 Vehicles built to military specifications are designed to provide a unique capability that is not always required for low-readiness units in peace time. Moreover such vehicles may be expensive to support, not

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[6] M113 – Armoured Personnel Carrier in use by the ADF.

readily replaceable, and may require particular operator competencies or involve peace time restrictions, such as those applying to the carriage of troops. Over the life of GS vehicle fleets, attrition and funding shortfalls will lead to less than optimal holdings, and it is the lower readiness formations which are most affected by the shortages. Over time, this will lead to changes in the full-time entitlement and loan entitlement mix for these units and, eventually, complete unavailability of some vehicles.

3.46 The nature of Reserve units, particularly those in rural areas, dictates a heavy dependence on vehicles for troop lift. In low-readiness formations, commercial vehicles as a full-time entitlement and access to GS vehicles for training and exercises may be more acceptable than a marked shortfall in GS vehicles.

3.47 The documentation for the procurement of light field vehicles contained an outline of the ADF's procurement approach for GS vehicles. This approach stated that the vehicles to be considered must be commercial vehicles in production which are fitted with, or suitable for fitting with, military accessories, or military vehicles in service with other armies. If military vehicles were selected they were to have significant component commonality with commercial vehicles. They were also to be supported through a commercial repair, maintenance and spares support network in Australia to allow supplementation of the Army system as necessary. It also noted that because the vehicles to be considered must be in-production or in-service some limited shortfall of performance against the requirements specified may be accepted.

3.48 Peacetime operations allow Army to use commercial service centres, spare parts stores and distribution infrastructure. Supporting vehicles in a combat environment is simplified by minimising the number of service items and resources that need to be managed in the area of operation.

3.49 The ADF currently owns a fleet of 5500 commercial vehicles and leases a further 900. Most are used for administrative purposes but, as mentioned previously, some have been obtained in lieu of GS vehicles and some are special purpose vehicles. There are commercial vehicles that are broadly equivalent to the Perentie 4x4 and Mack GS vehicles, but, there do not appear to be readily available commercial equivalents to the Perentie 6x6 and Unimog, although there are commercial vehicles that could carry out some of the functions performed by these vehicles.

3.50 CL four-wheel-drive (4x4) vehicles are predominantly built and sold for use as work vehicles and as recreational vehicles for off-road travel and towing various trailer loads. Some manufacturers offer "no

frills" or base model vehicles for light industry, mining and agriculture but generally do not build vehicles aimed at the military market. A small number of base model CL 4x4 vehicles have been used in peace keeping operations because of their low cost, ready availability and ability to provide administrative services and limited resupply missions in most areas of operation.

3.51 In recent years, Army has acquired additional Perentie 4x4 GS vehicles in association with a project known as Project Bushranger. The cost of these vehicles has been in excess of $100 000 each. In comparison, a commercial vehicle with similar performance characteristics, but lacking the special Army requirements, could be obtained for about $40 000. Rover Australia has developed a prototype vehicle derived from a current commercial model which meets most of the Army requirements. It is estimated that this vehicle could be obtained for between $60 000–70 000.

3.52 In September 1994, the 9th Transport Regiment sought approval to upgrade its Mack trucks to improve their performance and enhance driver comfort having regard to OH&S considerations. Army's Maintenance Engineering Agency considered a better option would be to purchase an off-the-shelf vehicle through the commercial vehicle program. It stated that a commercial vehicle would be better suited to the role required by the Regiment and would contain the features requested in its proposal. It believed the cost of purchase could be offset by the resale price and lower operating costs and that the Regiment's vehicles could be used to offset the need for GS cargo vehicles in other units. At the time of audit neither option had been pursued.

11 Brigade trial

3.53 Between April 1994 and June 1996 a trial was conducted to determine the implications of motorising a General Reserve brigade and the suitability of a generic CL 4x4 troop carrying vehicle and trailer to satisfy the requirement. The trial involved use of 150 vehicles and 150 trailers. It concluded that the introduction of a motorised capability improved the operational effectiveness of the brigade for vital asset protection in northern Australia.

3.54 The trial found that the generic 4x4 vehicle performed satisfactorily and proved to be extremely reliable. The Army Technology and Engineering Agency compared the vehicle with the generic GS vehicle specification and found that the vehicle provided some of the utility and much of the performance required of the GS vehicle and that it could be modified to meet the requirements, but at a cost. The commercial trailer was found to be unsatisfactory.

Land Headquarters proposal

3.55 The variation to Project Overlander's focus and timing, including the proposed LOT extension, has prompted Land Headquarters to consider the adoption of CL vehicles as either replacements for, or in lieu of, GS vehicles in selected situations.

3.56 The logistic support element in Land Headquarters has been concerned for some time about the increasing entitlement/ asset gap, especially for Perentie 4x4 vehicles, and has examined the use of commercial vehicles as a means of addressing this problem. A paper prepared in September 1998 for the Land Commander identified a shortage of vehicles and other factors associated with the present Perentie fleet that were likely to impact on operations. These included:

- vehicle fatigue and high activity rates reducing availability and overloading causing structural damage and high spares usage;
- possible modifications to the existing fleet to improve variant stability and OH&S concerns;
- an examination of external lift points and evidence of Perentie 6x6 chassis distortion; and
- a range of projects requiring the allocation of additional vehicles to achieve full capability.

3.57 The paper noted the difficulty of obtaining additional or replacement GS vehicles at a reasonable cost. It also observed that in recent times there had been increasing demand from units for commercial vehicles to be used in a wider role to overcome asset shortages and because of OH&S and safe carriage of troops concerns. The paper drew attention to the recent purchase of commercial vehicles to replace GS vehicles in 2nd Division units to overcome shortages in regional loan pools, and to the use of the newly freed GS resources to remedy deficiencies of GS vehicles in higher priority units.

3.58 The paper proposed commercial vehicles for General Reserve units and other selected units for use in vital asset protection, areas of operation support and intelligence roles. It suggested that a major difference between the GS and commercial vehicles—the greater durability of the former—could be overcome by through-life support and a much shorter LOT for commercial vehicles.

3.59 The paper indicated three possible management options if greater use of commercial vehicles should be adopted. These options were:

- management through the existing Army Commercial Vehicle Management Program (ACVMP);

- management as part of the GS vehicle fleet; and
- management as a new capability.

3.60 The first two options would require some modification of existing management arrangements. For example, ACVMP management would probably require some relaxation of the restriction concerning off-road use and some adjustment of the required revenue targets under that program. Management as part of the GS vehicle would require the vehicles to be specifically identified as "in lieu" vehicles.

Perentie 4x4 vehicle fleet

3.61 The present fleet of Perentie 4x4 and 6x6 vehicles was based on the 1984 Land Rover 110 series. Unique features to meet ADF requirements were a 3.9 litre Isuzu engine, unique military fittings, a specification to optimise cross country performance, 3.2 tonne and 3.6 tonne gross vehicle mass 4x4 derivatives and 5.6 tonne wide cab 6x6 derivatives. Between 1987 and 1994, 3706 vehicles were supplied.

3.62 Additional Perentie vehicles to support Phase One of the Bushranger Project were provided between 1995 and 1998. The contract extension for 270 vehicles was signed in 1994 but the low volume and material sourcing difficulties led to an escalation in price of 100 per cent. Rover Australia have advised that, because major components such as engine and gearbox are now unavailable, it is no longer possible to build additional vehicles to the Perentie specifications. The 110 series vehicle that was the foundation of the Perentie fleet was superseded by the Defender series which commenced commercial production in Australia in 1992. Since then there have been major changes in the Defender series.

3.63 If there is an extension of the LOT of the Perentie fleet it is likely to lead to an increase in vehicle attrition rates. As the fleet ages and enters the wear out phase of its life it is probable that unplanned maintenance and unpredictable demand for spare parts will occur. Some components are already unavailable and spare parts are scarce, with increasing delays and costs.

3.64 Some vehicles in the Perentie fleet have already passed their planned life of 10 years and the LOT for the bulk of the fleet will be reached by 2002. Past experience with GS vehicles indicates that, once a decision is made to replace the existing fleet, it is likely to be five to six years before the first of any replacement vehicles will be available. In the meantime there is every likelihood that the present entitlement / asset gap and the cost of maintaining the fleet will increase.

3.65 The options that could be considered would include:

- an upgrade of the existing fleet;
- supplementation of the fleet through the addition of modified CL vehicles; or
- the development of a replacement GS vehicle fleet.

3.66 An upgrade of the existing fleet would probably entail replacement of the existing engine and gearbox, improved suspension package and improved rollover safety features. These changes could lead to improved fuel economy and maintenance costs as well as better performance and enhanced capability. This action, however, would not address the entitlement / asset gap especially if further attrition occurs and, if anything, could exacerbate the present shortages while vehicles are taken out of service to undergo upgrade.

3.67 Supplementation of the fleet with appropriately modified CL vehicles could provide a cost-effective interim solution. Such vehicles could be used to overcome the entitlement / asset gap especially in Reserve units and would provide an opportunity to supplement the training pools, to provide higher readiness units with GS vehicles to support new functions and tasks and to replace aging or high maintenance vehicles.

3.68 Apart from the lower initial purchase price, the procurement of suitably modified commercial vehicles could offer other advantages. A substantial fleet of commercial vehicles could be managed in a similar manner to the ACVMP with a LOT of three to five years enabling regular turnover of vehicles with the prospect of recovering a significant proportion of the initial cost on resale. Regular turnover of vehicles would ensure that the ADF could take advantage of improving vehicle technology, presumably with better performance and reliability. The cost and availability of spare parts are likely to be improved with modern commercial vehicles. Responsive and widely accessible vehicle maintenance through the use of commercial dealer networks could reduce the need for ADF maintenance resources. The use of commercial dealer networks would also avoid the need to maintain large stocks of spare parts and the resources to manage these stocks.

3.69 Greater use of commercial vehicles could result in major savings in maintenance costs. It was found that the operating costs of commercial vehicles operated during the 11 Brigade trial were much lower than for GS vehicles. The bulk of servicing and repairs could be conducted through the commercial dealer network and any major maintenance could be covered under warranty.

3.70 Material examined during the course of the audit indicates there may be scope to replace some of the existing GS fleet with commercial vehicles either permanently or on an interim basis. There is evidence to suggest that the capabilities available in commercial vehicles have improved since the existing GS vehicle fleet was introduced into service. There could be merit in Defence undertaking a comprehensive analysis of the existing entitlements to GS vehicles to ascertain the extent to which existing entitlements could be satisfied by commercial vehicles or vehicles possessing some, but not all, of the features of GS vehicles.

Recommendation No.6

3.71 The ANAO recommends that, to ensure that the most cost-effective vehicles are used, Defence examine the functions and tasks carried out by units to determine those areas where commercial vehicles, or particular variants as necessary, could satisfy the requirement, either on a temporary or permanent basis, and amend vehicle entitlements accordingly.

Defence Response

3.72 Agreed. Defence has some concern about the impact on unit readiness levels. Commercial vehicles are currently being used in lieu of GS vehicles in certain units for some non-operational situations. This, however, does affect the overall number of GS vehicles available to meet any operational surge for the ADF.

ANAO Comment

3.73 The thrust of the ANAO recommendation was for Defence to identify the extent to which commercial vehicles could further satisfy requirements. The examination of unit tasking should take into account the requirement for GS vehicles and have regard to guidance provided by Defence Instruction (Army)—Admin 64–1, Basis of Provisioning, on reserve stock requirements for operational work-up.

4. Management of General Service Vehicles

This chapter details the organisation structures associated with the management of in-service GS vehicles, national fleet management processes and management information system requirements. It indicates where there is scope to improve the monitoring and coordination of vehicle management activities; to improve fleet management practices; and to facilitate the implementation of key management information systems.

Organisation structures

4.1 Defence organisational structures involved with the management of in-service GS vehicles are extensive and spread across a number of different Defence programs and Service Commands. The following areas in Defence have a significant involvement with the management of in-service GS vehicles:

- The Land Development Branch headed by the Director-General Land Development (DGLD) in Australian Defence Headquarters is involved with support mobility issues in that it sponsors, facilitates and monitors the progress of capability development initiatives and provides specialist advice in the development of the capital equipment and facilities program, including vehicles.
- The Directorate of Preparedness and Plans—Army (DPP–A) in Army Headquarters has responsibilities which include advising the Chief of Army on the development of force structure (including Army's organisational structure, unit roles, tasks and equipment entitlement) and materiel/ equipment policy (including logistic support concepts and instructions).
- Land Headquarters and Headquarters Air Command units own and operate the GS vehicles. Land Headquarters, the ADF's major user of GS vehicles, has an Operational Support Branch with personnel, logistics, transportation, supply, repair and vehicle recovery responsibilities and a Development Branch with responsibilities for developing force structure and new capabilities and provisioning new fleets.
- The Deputy Director of Establishments—Army (DDE–A), located in the Defence Personnel Executive, is responsible for determining and implementing strategies for the management of the Army equipment requirements, including vehicles.

- The Director-General Ground and Amphibious Warfare Systems, within the Defence Acquisition Organisation (DAO), is responsible for the acquisition and introduction into service of ground support vehicles. This area is responsible for Project Overlander (reviewing the ADF's field vehicle/ trailer needs) and Project Bushranger (aimed at introducing a new infantry mobility vehicle/ capability).
- Headquarters Support Command Australia includes Support Command Australia—Army (SCA–A), which incorporates the Army Equipment Management Agency (AEMA) and the Army Engineering Agency (AEA), the former Army Technology and Engineering Agency.
    - AEMA, through its Mobility Systems Logistic Management Directorate, manages in-service mobility materiel for Army and Air Force as well as the Army's Minor Capital Equipment Program. AEMA is also responsible for the provision of maintenance and engineering advice for new concepts and in-service tools and equipment (formerly undertaken by the Directorate of Maintenance Engineering Army).
    - AEA provides technical advice and engineering design, development, test and evaluation services as well as technical regulation of land equipment and systems.
- Support Command Australia—Air Force retains responsibility for maintaining the establishment of Air Force's small fleet of GS vehicles. Requests from bases for either new or replacement vehicles are reviewed by Headquarters Air Command against the establishment and on an 'as needs' basis. Once an acquisition is approved the vehicles are either acquired through AEMA (for minor capital acquisitions eg. under $20 million) or DAO (for major capital acquisitions).

4.2 Various major organisational elements in Defence examine matters relating to the capability of the existing GS fleet, changes to the fleet and the need for replacement, enhancement or fleet Life-of-Type (LOT) extension. For example, DGLD has contributed to Project Overlander and was the sponsor for a project to acquire new medium recovery vehicles. Work has been done in the Operational Support Branch of Land Headquarters to address difficulties being experienced with the Perentie fleet. DPP–A has initiated work into the scope for LOT review of the GS vehicle fleet. AEMA is responsible for providing materiel management advice for the introduction of new vehicles, for managing several projects to acquire trailers for the GS vehicle fleet under the Minor Capital Program and for developing instructions for fleet modification. AEA is involved in developing engineering solutions for identified problems with the GS fleet. Within DAO, Project Overlander (which was initiated in 1992) is

aimed at determining the current and future capability requirements for field vehicle and trailer fleets. The project has included a study into the management information requirements and the reliability and maintainability of the GS fleet. Project Bushranger is responsible for introducing into service a new mobility vehicle. The initial phase involved the trial of new mobility concepts using Perentie vehicles.

4.3 As illustrated above, the management of in-service GS vehicles is undertaken by a complex administrative structure where some responsibilities are duplicated and in which there is no single organisation responsible for the overall direction and management of the GS fleet.

4.4 In July 1997 Commander Support Australia issued a directive (13/97) for the transfer of base logistic support for ground mobility vehicles from Navy and Air Force to SCA–A. A transition plan containing three phases was endorsed in December 1997. Initiated in 1998, the first two phases of the plan involved SCA–A assuming control of the Navy and Air Force ground vehicle fleets and required the development of an integrated ADF mobility organisation within SCA–A. The third required the amalgamation of existing fleet management organisations and involved the transfer of vehicles, financial and logistic systems, personnel and engineering and support management into SCA–A. Within the new mobility organisation there are two National Fleet Managers (NFM) for GS vehicles: one for lightweight / light vehicles and the other for medium / heavy vehicles.

4.5 The ANAO considers that vehicle fleet management for all three Services should be centrally coordinated and supports the thrust of the SCA–A initiative. As discussed later in this report, however, SCA–A is responsible only for ongoing fleet support processes such as monitoring vehicle operations, maintenance and budgeting. Available resources do not enable it to focus on higher-level tasks such as monitoring vehicle condition, analysing fleet operating and maintenance costs, fleet rotation, integrated logistic support planning and configuration management.

4.6 It is not clear that there is any central point which has responsibility for, or is coordinating and integrating, these varied activities to ensure that there is no overlap of responsibilities or duplication of effort. The complexity of the existing organisation structure highlights a need for an organisational unit to be vested with responsibility for identifying needs and monitoring activities aimed at resolving them. There needs to be a central body with responsibility for overviewing and monitoring the effectiveness of the GS fleet, identifying and rectifying any deficiencies in the fleet, initiating LOT reviews and monitoring the effectiveness of support arrangements.

4.7 Given that the focus of GS vehicles is land mobility and that Army is the fleet manager for support vehicles, the ANAO considers that Army Headquarters is well placed to provide more central guidance and direction for the management of Defence GS vehicles. The ANAO acknowledges that Army Headquarters is now undertaking a series of initiatives in regard to the GS fleet including monitoring the entitlement/asset gap and developing tasking to review the LOT for the GS fleet. The ANAO considers, however, that there is scope to improve the management structure, to enhance the monitoring and coordination of vehicle management activities and for further integration of vehicle management processes to achieve greater efficiency.

Recommendation No.7

4.8 The ANAO recommends that, to improve the monitoring and coordination of vehicle management activities, Defence identify a central area of the agency to take the leading role in, and be responsible for, coordinating and integrating activities to monitor the adequacy of existing GS vehicle capabilities and to determine the future requirements for GS vehicles.

Defence Response

4.9 Agreed.

National fleet management processes

4.10 The SCA–A National Fleet Managers for GS vehicles are involved with a range of activities relating to the operation of the GS vehicle fleets including finance, information management, maintenance, inventory management and the requirements of equipment sponsors. The following paragraphs discuss issues relating to some of the more significant national fleet management responsibilities.

Financial control

4.11 The financial control activities undertaken by the NFM include forecasting, commitment and expenditure phasings, assessing the impact of any resource shortfalls and preparation of Fleet Impact Statements as well as the annual Fleet Management Brief to provide guidance to Regional Fleet Managers on the funding priorities, supply support arrangements, loan pool management, stock rotation plans and issues affecting regional maintenance activities. The bulk of the funds managed by the NFM are used in the repair, overhaul and modification of vehicles. Issues relating to the funding of these activities are discussed in the chapter on repairs and maintenance.

Fleet condition and rotation

4.12 One of the fundamental activities of fleet management is the process of monitoring fleet condition and usage patterns. This involves activities such as:

- liaison with users and other agencies involved in the materiel management of the fleet;
- identifying fleet requirements;
- managing fleet rotation; and
- maintaining a database on each asset in the fleet.

4.13 Having a sound understanding of the condition of each vehicle and of groups of vehicles, such as particular variants, is crucial to making effective business decisions. This is reflected in the SCA–A Fleet Management Handbook, which requires fleet managers to know the condition of their fleets. Factors such as the number of kilometres that each vehicle has travelled, the maintenance history and the condition of engine, suspension and chassis are, however, either not recorded or are not readily available. Some information is recorded about vehicle condition; for example, kilometres travelled are recorded in log books and in the Electrical and Mechanical Engineering Management Information Computer (EMEMIC) system when vehicles are serviced, but these are stand-alone information sources at the workshop level and there is no facility for providing an overall understanding of the state of the GS vehicle fleet. Although EMEMIC data is transferred monthly to the EMEDATA system, internal Defence correspondence has noted that EMEDATA does not provide sufficient information to give a clear picture of fleet condition.

4.14 A database containing kilometres travelled, maintenance history and key details from vehicle inspections, would enable improved decision-making on fleet management activities, such as fleet rotation. The ANAO considers that the absence of readily available information on the condition of fleet assets is a significant weakness in the ability of the NFM to properly manage the GS fleet.

4.15 Fleet rotation is a fleet management practice which can be used to even out the wear in a fleet as it involves the exchange of high usage vehicles for those of lower usage. It is also identified in the SCA–A Fleet Management Handbook as an activity required to be undertaken by NFM. The ANAO noted very few examples of this activity in the life of the current GS fleet. In the past, vehicle rotation between units has occurred as ‘one-off’ exercises (eg. the swap of two Mack tankers between 26 Transport Squadron and 7 CSSB in 1998) or with vehicles that have

exceeded the One-Time Repair Limit and have been repaired via the Extensive Repair Line (ERL). Units supplying vehicles for ERL refurbishment would have their vehicles replaced by Repair Pool vehicles.

4.16 In 1994 some 24 Unimogs, which had been deployed overseas with Operation Solace, were refurbished on the ERL. Subsequently the ERL was funded to refurbish specifically identified Mack, Unimog and Perentie vehicles, some 61 being refurbished in the 1997–98 project. A Unimog Repair Line also operated in Townsville in 1997–98. The ERL has probably been the most significant mechanism for vehicle rotation, yet it only involves around 1 per cent of the GS fleet each year.

4.17 The rotation of vehicles between units that has occurred has not, therefore, been extensive and does not appear to have been undertaken in an ongoing, systematic manner. Discussions with the NFM indicated that fleet rotation was limited due to a range of factors. One factor limiting stock rotation is the lack of information on fleet condition and usage at the individual asset level. The ANAO noted that there appears to be a wide variation in the condition of vehicles in some of the GS fleet variants. Some units have a very low usage of the vehicles that they have been allocated. Other units with a higher operational tempo may average a higher distance travelled in far rougher conditions. Similarly, units with a shortage of vehicles are likely to have a far higher average usage. Funding restrictions have also resulted in vehicles being maintained to different levels. Those maintained to a 'serviceable' (as new) level are in better condition than those maintained to a 'taskworthy' level.

4.18 The variation in vehicle condition and the 'ownership' of vehicles by units result in a reluctance to swap well maintained vehicles for those in poorer condition. The NFM cannot force units to swap vehicles as SCA–A does not 'own' the vehicles and this difficulty is compounded by the lack of detailed knowledge about the condition of each asset. With the Perentie, Unimog and Mack fleets now reaching their planned LOT, fleet rotation would appear to be one activity which should be pursued in order to maximise the life of each fleet.

4.19 The ANAO noted, in the 1998–99 Fleet Management Brief, that no funding had been allocated in the SCA–A budget for vehicle stock rotation programs. The ANAO considers that Defence should identify those elements of its GS vehicle fleets which would benefit from vehicle rotation and implement an ongoing vehicle rotation program.

Integrated Logistic Support

4.20 Integrated Logistic Support (ILS) is a whole-of-life management discipline that addresses the provision of support and services to materiel systems. Defence ILS policy is described in Defence Instructions DI(G)Log 03–6 and in DI(A)Log 1–33. Defence policy requires ILS to be applied throughout the materiel process to ensure that equipment procured meets any operational requirements and can be supported effectively throughout its LOT.

4.21 An essential part of the ILS process is the development of an appropriate ILS concept in Major and Minor Capability Submissions. Defence policy notes that the ILS concept is the foundation for developing the logistics support for an equipment or system and should be progressively refined as the project matures. It has a number of elements including maintenance and supply support, technical data, personnel, training, facilities, storage and transport, and support equipment. The ILS concept:

- describes the essential features and characteristics of the logistic support that are likely to be required to support the equipment;
- provides indicative through-life support costs for the equipment's planned LOT;
- provides a link to the New Program Proposal process and the Force Structure, Facilities and Personnel Plans;
- provides Reliability, Availability and Maintainability predictions; and
- provides an agreed foundation for the ILS Plan which outlines ILS requirements and timeframes and is developed as part of a Project Management and Acquisition Plan.

4.22 DI(A)Log 1–33 requires an Integrated Logistic Support Instruction (ILSI) to be developed for each significant grouping or family of equipment. In this context, 'significant' refers to both procurement costs and through-life operating expenses. GS vehicles therefore comprise several families or fleets (eg. the Unimog fleet). The ILSI describes support arrangements, configuration management processes, ILS procedures, through-life support and disposal requirements. As an ILSI details support to one item or family of equipment, each of the GS fleets should have an approved ILSI.

4.23 During an equipment's in-service phase SCA–A has the responsibility for maintaining the ILSI and for issuing required amendments. The current SCA–A Fleet Management Handbook (December 1996) notes that the Fleet Management Plans (FMP) are being progressively replaced by ILSI. However, several draft ILSI had been

developed, but none had been approved for any of the GS vehicle fleets at the time of audit fieldwork. The handbook requires an annual review of ILSI, but it also notes that the 'dynamic fleet management environment' does not easily allow for timely amendment to the FMP/ILSI. A Fleet Management Brief is therefore issued in July each year to guide the management of each fleet for the next financial year. The ANAO considers that an approved ILSI should be produced for each vehicle fleet.

Configuration management and fleet modification

Configuration management

4.24 Defence Instruction DI(G)Log 08–4 outlines Defence policy on configuration management of systems and equipment. Configuration management is a process for identifying and recording the functional and physical characteristics of equipment, controlling changes to those equipments and recording/ reporting the physical incorporation of the changes.

4.25 The Army Configuration Management Manual (CMMAN) requires that configuration management be accomplished by promulgation of approved configuration management concepts, then plans and finally instructions. All of the documents cover the same subjects, but convey differing levels of detail and are aimed at different audiences. It is intended that each one forms the basis for the next. CMMAN nominates the configuration manager as responsible for production of all three configuration management documents. The SCA–A National Fleet Managers are the configuration managers for each of the major GS vehicle fleets (Perentie, Unimog and Mack trucks).

4.26 The ANAO noted, however, that no configuration management concepts or plans are currently available for GS vehicles and no ILSI's are currently approved. Only limited configuration management detail is available in other documentation such as FMPs.

Configuration control

4.27 The configuration control process is designed to manage the implementation of approved changes, not to influence the actual design. Control should be achieved via the systematic proposal, justification, evaluation and coordination of design changes.

4.28 Configuration is controlled by an appointed Configuration Control Board (CCB) and by the instigation of an Engineering Change Proposal system. No other authority is to be used to implement permanent changes to a capability. The CCB membership comprises all parties having an

involvement with the capability eg. the Perentie fleet CCB was created in June 1994, including the NFM in AEMA, the manufacturer (Rover Australia) and with AEA appointed as the technical adviser.

4.29 Defence noted that the Perentie CCB meets every month but not as frequently for the other GS vehicle fleets. Rover Australia indicated that although there was day-to-day contact with Defence on an 'as needs' basis, it was generally only requested to attend the CCB on an annual basis.

4.30 Under the contract with Rover Australia the contractor is the design authority for the vehicles it produces and it maintains a master record index of the equipment delivered to Defence. In effect it holds the configuration management records for the Perentie fleet on behalf of the NFM. Rover is required to prepare and maintain the Repair Parts Scale (detailed repair parts lists) for each vehicle variant, for use by Defence in the maintenance of its fleets.

4.31 Mandatory controls and procedures over the modification of equipment are outlined in Electrical and Mechanical Engineering Instructions (EMEI). The instructions detail the procedure to be adopted by units and workshops when modifications, trial modifications or local modifications are made to equipment.

4.32 Modifications are divided into two groups which indicate the priority and the urgency with which they are to be carried out. Group One is a vital modification which is to be carried out with minimum delay. These modifications are generally incorporated for reasons of safety or operational requirements. Group Two is a modification which is not vital but considered desirable to be carried out when equipment is available during the normal repair function and is incorporated for standardisation, modernisation, interoperability or as a functional improvement.

4.33 In addition to the controls which exist over the fleet-wide modification of vehicles, unit commanders' directives outline the modification of vehicles to meet a unit's local requirements. Approval for the local modification of equipment is requested through the formation headquarters. Such modifications have to be reversible as the equipment has to be restored to its original condition prior to permanent transfer from the unit.

4.34 In 1998 unit inspections by the Maintenance Advisory Service (MAS) highlighted a range of local modifications to vehicles which had not been subject to the formal approval process. In a follow-up review

of an MAS inspection report of a Regiment it was found that approval had been sought for only half of the modifications and no action had been taken on the remainder. The impact of unapproved modifications can be significant. For example, some modifications, such as the fitting of over-cab roof storage, have led to the overloading of vehicles with resultant safety and handling problems and associated increased wear and tear on chassis and tyres. Others have impacted on unit deployability; for example, increasing the height of the canopy structure has precluded the transport of the vehicle by transport aircraft.

4.35 As a result of past MAS reviews units have reinforced their standing orders with additional instructions either to gain approval for the modifications by submitting the required proformas and technical reports or to return the vehicles to their original condition. One unit has also implemented a database of local modifications to track the status of requests for local modification of equipment, as well as action taken in respect of unapproved modifications.

Configuration status accounting

4.36 Configuration status accounting is achieved by recording the current approved configuration for each system, by recording and reporting the results of configuration audits, including corrective action and amendments for any discrepancies found and by ensuring the proper documentation of all approved design changes.

4.37 At the time of audit fieldwork no configuration management computer systems were in use to monitor GS vehicle configuration. Configuration management's key benefits are derived from the integrity of managed data and the subsequent ability to make decisions from a solid knowledge base. If there is a chance that a capability will require further production, modification, testing or regulated disposal, the presence of continuous configuration management information is invaluable. The maintenance of configuration management information also helps to identify the real cost of change and could be used in making deployment judgements for GS fleet variants.

4.38 The CMMAN notes that the configuration management process is to be accomplished through use of 'SHERPA' software. The ANAO observed that SHERPA software was being used to monitor configurations of the M113 and ASLAV vehicles. Internal Defence correspondence noted that SHERPA is a satisfactory document management tool but not considered to be suited to the management of equipment.

4.39 The ANAO notes Defence documentation which identifies the required level of GS vehicle configuration management as concentrating

only on specific items with safety or mission performance requirements. The ANAO considers that Defence should pursue the development of configuration management software to record the current configuration of key aspects of GS vehicles, by Army Registration Number. This software should be compatible with the Standard Defence Supply System, given that this system will record vehicle maintenance activities and that configuration management tools should be integrated into the maintenance process.

Configuration auditing

4.40 A configuration audit is an independent evaluation of a product to ascertain compliance with specifications, standards, contractual agreements or other criteria. It can be used to test the level of compliance achieved, with the aim being to identify any areas requiring additional effort to achieve compliance. The CMMAN notes that auditing is to be conducted on both a rostered and as required basis. The configuration manager is responsible for the scheduling, resourcing, conduct and reporting of configuration audits. This does not preclude the use of specialist organisations such as AEA, as the configuration manager must ensure the audits occur, not necessarily organise their conduct.

4.41 SCA–A noted that it has no spare resources to undertake audits of fleet configuration management. The only sort of configuration management audits undertaken are the equipment maintenance inspections done by MAS. Land Headquarters is intending to initiate an inspection process which will focus on the configuration and health of the assets held by its units. The CMMAN notes that successful implementation of Army's configuration management policy requires appropriate resources to be allocated for the entire materiel cycle, in accordance with the level of configuration management to be applied.

4.42 Knowledge of the configuration of equipment is an essential element in the cost-effective management of equipment and in the provision of through-life support. To maintain operational effectiveness, safety and economic logistic support, recording of the most up-to-date configuration of key components of equipment must take place throughout the full life-cycle.

4.43 The ANAO considers that Defence should identify the extent to which GS vehicles should be subject to configuration auditing and implement a systematic configuration audit program of the GS fleets. There may also be benefit in Defence contracting-in fleet management expertise to help alleviate some of the problems identified above.

Recommendation No.8

4.44 The ANAO recommends that, to improve national fleet management, Defence:

a) identify those elements of the GS vehicle fleets which would benefit from vehicle rotation and implement an ongoing vehicle rotation program;

b) issue an approved Integrated Logistic Support Instruction for each vehicle fleet, as required by Defence Instruction DI(A)Log 1–33;

c) pursue the cost-effective development of configuration management software to record the current configuration of key aspects of GS vehicles; and

d) identify the extent to which GS vehicles should be subject to configuration auditing and, where justified, implement a program of systematic configuration audits of the GS fleet.

Defence Response

4.45 Agreed.

Information management

Current management information systems

4.46 The maintenance of accurate and timely management information is critical to the operation of effective fleet management processes. Defence operates a number of different information systems which are used in the management of the GS fleet including:

- Standard Defence Supply System (SDSS)—a supply management system which provides Defence-wide inventory control and stores holding functions required for day-to-day supply support;
- Automated Quartermaster System (AUTOQ)—a unit level inventory control system which automates Army unit stores accounts;
- Electrical and Mechanical Engineering Management Information Computer (EMEMIC)—used in workshops to manage maintenance and resource activities in workshops;
- Electrical and Mechanical Engineering Data System (EMEDATA)—a historical database drawn from EMEMIC on equipment maintenance activities and costs which provides limited assistance for NFM to forecast future maintenance requirements;
- Principal Item Management Information System (PIMIS)—used by NFM to extract data from other establishment and logistic systems to assist in the management of principal items;

- Defence Financial Management Information System (DEFMIS)—records and maintains financial information used throughout Defence;
- Local Finance System (LOFIN)—used by NFM to assist in the management of regional commitment and expenditure of their fleets; and
- Loan pool allocation systems (LOPAS/ LEAP).

4.47 Despite the existence of a range of information systems, GS fleet management suffers from a lack of accurate, timely and readily available management information. Existing systems such as PIMIS and EMEDATA provide some useful management information but much of the required information is not easily retrieved and many existing systems are stand-alone. There is also a degree of duplication in data holdings; eg. Directorate of Establishments System (DES), PIMIS, AUTOQ and SCA–A spreadsheets hold asset and establishment data. Another area of concern is the ability of the Army to capture and retain accurate data on vehicle and repair parts usage rates and costs; eg. no system exists for the collection and capture of details of repair parts used by contractors and the dealer network in repair of the current fleets of heavy and medium trucks. SDSS is the primary system used by NFM for inventory control and, as discussed later in this chapter, has had a range of enhancements identified to improve its fleet management functionality.

4.48 The ANAO noted internal Defence correspondence as far back as 1982 which highlighted a lack of readily available statistical information on existing vehicle fleets, in particular for:

- entitlement and asset information;
- equipment condition, availability and utilisation;
- maintenance and operating costs;
- vehicle attrition rates;
- utilisation of pools (repair, training and equipment);
- stock rotation; and
- repair turnaround times.

Although a range of developments is being put in place to address these deficiencies, progress has been slow.

Proposed enhancements to the Standard Defence Supply System

4.49 SDSS has been identified by Defence as the system which is to be at the core of future fleet management information systems. The Directorate of Logistic Information Management is responsible for the

development of SDSS and the enhancement of its functionality through a number of projects including the 'Logistic Systems Rationalisation' and 'Introduction of the MIMS Maintenance Modules (MMM) into Base Logistic Units.'

4.50 The Logistic Systems Rationalisation involves a number of upgrades to SDSS designed to enhance fleet management including:

- the replacement of the Commercial Vehicle Management Information System;
- the facility for SDSS to manage the allocation, rotation and scheduled maintenance of loan pool equipment (the functionality currently provided by LOPAS);
- the integration of the existing fuel bowser system 'Fuel Scan' into SDSS, the use of the SDSS fuels and oils module with an interface to load data from third party fuel cards and the provision of accurate and timely vehicle utilisation data;
- the replacement of the PIMIS data warehousing application with SDSS and the provision of an interface to the DES system;
- the replacement of the AUTOQ and Divisional Inventory Control Visibility and Accounting systems within units; and
- the implementation of an ad hoc reporting system called MIMSVu.

4.51 At the time of audit, training and hardware installation for the introduction of the SDSS—MMM were nearing completion. Defence considers that MMM represents a significant improvement over the existing EMEMIC system, but it has identified a number of proposed modifications to enhance MMM including:

- Reports. The general MMM reports do not support Defence's current business practices. This issue is being addressed by the development of additional MIMS reports and MIMSVu reporting capabilities;
- Labour Scheduling and Costing. In order to provide the MMM package with the personnel data required to conduct maintenance activities, units are currently required to maintain separate personnel details in SDSS. To avoid this duplication of effort Defence correspondence has highlighted the need to interface the PMKeys Human Resource Management package with the supply and maintenance packages, but also noted that little progress has been made;
- Multi Item Work Order. Small items are generally repaired in lots, but the repair details are recorded individually. It is recognised that this process is inefficient and that there is a need for an ability to conduct bulk updates of tasks;

- Owner District. SDSS provides visibility of transactions across all districts, but each depot maintains its own information. Processing activity cannot be conducted at the global level. The automatic updating of the owner district fields and the relationship with the equipment's physical location remains an issue;
- Tracking and Tracing. Vehicles should be tracked and the components traced. Currently Army does not effectively conduct Configuration Status Accounting (CSA) of its equipment. Items requiring CSA are yet to be identified;
- Job Duration Codes. MMM requires the user to manually update the time a job is held at a particular status, although this process was automatic in EMEMIC. Currently in order to identify the status of a job, the planner must examine each task individually;
- MMM Work Order Status. MMM currently supports a four step work order status whereas EMEMIC supports five (open, authorised, planned, closed and finalised). The additional status (planned) informs the planner that all equipment, personnel, parts and the item to be repaired are available for the commencement of the task. This prevents the equipment being moved onto the workshop floor before the resources are available to conduct the task; and
- Integrated Technical Manual. Another project is the development of a manual to provide an electronic representation of Electrical and Mechanical Engineering Instructions.

4.52 To provide SDSS with sufficient capability to satisfy Defence needs the series of enhancements outlined above need to be pursued, in particular the ad hoc reporting system, loan pool allocations, fuel usage and vehicle utilisation, vehicle maintenance activities, configuration management and a linkage to Human Resource Management data.

Executive level management information

4.53 There is currently no system which produces executive level information for comparison against fleet performance indicators, either at the national or regional levels. Such indicators should be used to monitor the day-to-day operations of each fleet, including cost and utilisation data. The ongoing maintenance history of each fleet should also be monitored over time by variant and by location, to provide trend data which can be used to make business decisions about the fleet. The ANAO identified a range of data available on GS vehicles. In some areas the data, such as the LOT of each fleet, was conflicting. In other areas there was little information that was readily available; eg. fleet condition and operating costs. For vehicle fleet management to be effective Defence needs a system which will enable the central gathering of available data and provide an executive overview of fleet operations.

4.54 Fleet managers should have access to a range of data, by vehicle Army Registration Number, including current vehicle location, kilometres travelled, fuel consumption, repair and maintenance costs. The operating costs of each fleet/ variant/ vehicle could then be compared with benchmark data (eg. as provided by 'whole-of-life' costing models using standardised industry data for parts and labour) in order to determine how these vehicles are performing. Although it is accepted that the Defence fleet is subject to a range of factors not faced by commercial fleets, the core principles of commercial practice remain relevant and would provide a useful baseline as to the operational efficiency of Defence fleet operations. An overseas review of military support vehicles notes the benefits of comparison with commercial best practice and that efficient fleet management requires modern information systems providing relevant data, financial expertise, effective cost control and experienced personnel.[7]

4.55 The Regional Fleet Managers located in Army logistic units are responsible for the provision of vehicle repairs and maintenance, managing fleet inventory (including principal items, rotables[8] and repair parts), provisioning of all locally procured materiel replacement items for the fleet, managing the regional loan pools, as well as exercising base logistic responsibilities on a regional basis. ANAO fieldwork indicated that one of the major issues facing Regional Fleet Managers is the lack of detailed management information on their operations as well as realistic performance indicators to provide them with a benchmark against which to monitor their operations. Units tend to develop their own systems for such administrative support. One such system being developed in southern Queensland was identified as a useful information system, but the quality and type of information available to the regions vary significantly and action is required to coordinate the development of management information systems to ensure consistency across regions.

4.56 Defence has identified many of these deficiencies over a number of years but information systems development has been slow. The range of proposed enhancements to vehicle management information systems is extensive. Given the poor state of current vehicle management information systems and the slow rate of change, the ANAO considers that Defence should identify those enhancements which have strategic significance and facilitate the implementation of the elements which are considered to have priority.

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[7] National Audit Office, Report by the Comptroller and Auditor-General, *Management of Support Vehicles in the Ministry of Defence (HC656),* 14 October 1991, HMSO Publications, United Kingdom.

[8] Rotables are major vehicle components such as engines.

Recommendation No.9

4.57 The ANAO recommends that, to overcome current deficiencies in vehicle fleet information, Defence identify those enhancements of vehicle management information systems which should be given priority and actively pursue appropriate solutions.

Defence Response

4.58 Agreed. A study into methods used by commercial fleet managers that may be adaptable to military application would be appropriate.

Unimog Medium (4 tonne) Truck with Workshop Shelter

5. Repairs and Maintenance

This focus of this chapter is on GS vehicle maintenance and repair processes, including current operating costs and funding issues. It highlights issues relating to the care and maintenance of equipment, high maintenance costs and the need to review the cost-effectiveness of the Extensive Repair Line.

Maintenance of General Service vehicles

5.1 The primary objective of maintenance in the ADF is to maintain technical equipment efficiently and effectively in pursuit of military preparedness objectives. Operational and training commitments require a high level of equipment serviceability and availability and this is dependent on the quality and timeliness of maintenance. The term maintenance covers inspection, servicing, repair, overhaul, testing, upgrades, modification and recovery of technical equipment. Within Army, the responsibility for maintenance extends from non-technical inspections by equipment operators to technical planning and the development of engineering standards.

5.2 One of the major methods employed to ensure equipment is maintained, and that unit commanders are aware of their equipment's serviceability, is the inspection process. There are two categories of equipment inspections: non-technical and technical. Non-Technical Inspections (NTI) are carried out by unit personnel to ensure that equipment is safe and operational. Units should develop NTI programs detailing:

- the equipment to be inspected;
- the inspection intervals;
- the personnel responsible for inspections; and
- the procedures for follow-up action.

5.3 Technical Inspections (TI) are inspections carried out by qualified trades personnel to determine the level and degree of repairs required and where they will be done. TI are carried out on a frequency interval (either kilometres travelled or elapsed time). These intervals and technical standards are detailed in Electrical and Mechanical Engineering Instructions (EMEI).

5.4 There are generally three levels of maintenance support, as follows:

- unit maintenance support is provided to a unit by attached trades staff or workshop;
- formation maintenance is provided to a unit by a Brigade Administrative Support Battalion (BASB) or a Combat Service Support Battalion (CSSB) workshop for maintenance tasks that are beyond the scope of unit maintenance elements; and
- force maintenance support (base line) is provided by Support Command logistics groups for maintenance tasks beyond the scope of BASB/ CSSB workshops.

5.5 The unit line elements are often under strength and the formation line workshops, unless on a concentration period, are no better. Thus a substantial portion of the load is transferred to Support Command (base line) agencies. Support Command is also responsible for the maintenance of pool stock, which forms the bulk of unit Minimum Level Of Capability entitlement. Thus Support Command effectively conducts a large amount of unit, formation and base line maintenance. These processes are not always compatible. Ideally, base line activities run as an assembly-line style of activity with longer forecast lead-times (they are more efficient), while unit and formation line require a jobbing or on-occurrence response (which is less efficient, but more effective in terms of response time).

Maintenance Advisory Service report on unit equipment maintenance

5.6 The Directorate of Maintenance Engineering—Army has provided a maintenance advisory service that delivers independent technical advice to functional commands on equipment readiness and factors affecting readiness. During 1997 the Directorate's Maintenance Advisory Service (MAS) reviewed critical equipment list items in 47 Land Command and 15 Training Command units.[9] The MAS inspected 620 vehicles and found that only seven per cent were taskworthy. The remaining 577 (93 per cent) were classified as Repairable 'XX' (Not to be Used).

5.7 The MAS report attributed the condition of the vehicles to:

- the quantity of the services overdue;
- the quantity of technical inspections overdue;
- the quality of technical inspections; and
- the quality and lack of follow-up action of non-technical inspections.

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[9] Directorate of Maintenance Engineering—Army, *Summary Maintenance Advisory Service 1997*, 2 March 1998.

5.8 In relation to non-technical inspections, general faults identified by the MAS inspections included twisted and/or frayed seat belts, inoperative lights and unserviceable warning devices, such as horns and mirrors. Other problems applying to all fleets included contaminated brake and clutch fluids and improper servicing of cooling systems. Problems relating to two or more vehicle fleets concerned the use of tyres over five years old and unauthorised wiring modifications to the vehicles. Specific issues were also detected for individual fleets.

5.9 Other general factors affecting unit maintenance noted in the report were:

- a continuing decline in operator maintenance; non-technical inspections, if conducted at all, were mostly ineffective in that faults had either been overlooked or the operators did not know what to look for;
- units continuing to operate equipment that had been classified as Repairable 'XX' (Not to be Used) even though operating such equipment may cause further damage or present a danger to personnel;
- a failure to observe intervals for technical inspections with a high percentage of equipment being identified as overdue for technical inspection;
- the downsizing of unit trades positions had placed unrealistic workloads on remaining trades staff;
- a failure to enter details of repairs, servicing and modifications into the Record Book of Service Equipment with the result that records of equipment history were inaccurate;
- servicing not being carried out within specified timeframes and operators not assisting with servicing leading to trades staff spending extra time on servicing; and
- units implementing local modifications to equipment without approval, including some that were dangerous, such as locally produced mounting frames that are not secure when fitted in vehicles, and have the potential to become a missile in the event of an accident.

5.10 The MAS report observed that when operators were questioned on the reasons for incorrect maintenance, the stock answer was ignorance of technical publications and instructions in the care and maintenance of equipment. It also noted that junior ranks were having more care and maintenance responsibilities placed upon them and the tasks associated with these responsibilities were very often being conducted without proper supervision. It stated that more knowledge is required at the

lowest level and more emphasis should be placed on these matters at the grass roots stage of training. At the junior levels, RAEME[10] tradestaff do not have knowledge of the techniques needed to effectively complete the jobs allocated to them.

5.11 In its conclusion the MAS report stated:

> *Army over the last 20 years has continued to modernise its inventory to increase its operational capability yet the care and maintenance of its assets has not improved. If a 1977 Equipment Inspection Service Report on any unit was compared to a 1997 MAS report on any unit it is with no doubt that the comments would be identical. Improper use, care and maintenance of equipment leads to equipment being offline, costly repair and increased workloads in repair agencies. Army can ill afford to let any of these occur. [paragraph 31, 32]*

5.12 The ANAO reviewed the response of 7 Task Force to MAS findings. It found that the Commander 7 Task Force had issued a Directive (14/98) in May 1998 addressing most of the issues raised by the MAS and detailing the responsibilities and procedures for equipment management, repair and recovery within the Task Force. Subsequently, a review of one of the regiments within 7 Task Force was conducted in November 1998 to ascertain compliance with the MAS recommendations and the Command Directive. This review found that there had been only partial implementation of the MAS recommendations and that the regiment was not complying with the Command Directive.

5.13 The MAS summary for 1997 indicates that the problems are widespread and not limited to isolated units. The ANAO is concerned that, despite the efforts of the MAS and the issue of a Command Directive to address the problems, deficiencies in maintenance are still occurring.

5.14 The nature of the issues raised by the MAS report and its conclusion suggests that the problems are endemic and do not lend themselves to easy and simple solutions. At the time of the audit, Army Headquarters was in the process of developing an Equipment Management Plan which may address some of the issues. However, as this Plan was still in the development phase it was not possible to assess the extent to which it would provide remedies to maintenance issues.

5.15 Although the focus of this report has been on the maintenance of the GS vehicle fleet, it is evident that the issues relating to the care and maintenance of equipment have a much wider application. In this respect,

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[10] RAEME – Royal Australian Electrical Mechanical Engineers.

the ANAO supports the views contained in the MAS report summary that, during initial training and throughout their careers, the training of soldiers and potential leaders should stress the importance of the proper operation, care and maintenance of equipment to the achievement of Army's objectives. The ANAO considers this should be reinforced through continuing enforcement of instructions and directives and the development of systems and processes to assess the effectiveness of these measures. An important element of these processes would be a programmed follow-up of the implementation of MAS recommendations.

Recommendation No.10

5.16 The ANAO recommends that, to maximise vehicle serviceability, personal safety and mission achievement and to avoid unnecessary costs, Defence follow-up the implementation of recommendations arising from Maintenance Advisory Service inspections.

Defence Response

5.17 Agreed. Inspection criteria are quite stringent. Vehicles can be classified 'XX', (Not to be Used), for defects ranging from low tyre pressure and faulty light bulbs to unserviceable brakes and more serious mechanical problems. The majority of 'XX' classified vehicles have defects that can be rectified quickly. In recognition of this issue, a Staff Officer, Grade One Maintenance Engineering (LTCOL) position was established at Land Headquarters by Support Command-Army in January 1999.

ANAO Comment

5.18 The ANAO notes Defence's response but observes that, despite the efforts of the MAS and the issue of a Command Directive to address identified problems, deficiencies in maintenance are still occurring. For this reason the ANAO recommended that further attention be given to following up the implementation of recommendations arising from MAS inspections.

Maintenance costs

5.19 Ideally, the ADF should be able to identify the costs associated with maintaining its GS vehicle fleet, not only overall but in respect of model variants and individual vehicles. At present, this information can be obtained only by manual extraction of data from a range of different systems and is very costly.

Comparison of operating costs of current vehicle fleets

5.20 The Project Overlander report contained costing data collected in association with a reliability and maintainability study. Using these

data the ANAO calculated the average cost of labour and parts per kilometre for each type of GS vehicle. However, there were some doubts about the accuracy of these data as the total cost of spare parts had been extrapolated from a small sample. A comparison with actual expenditure data revealed that this had resulted in an overstatement of the cost of spare parts.

5.21 Although the ADF was unable to provide accurate data for the full cost of repairs and maintenance, the ANAO obtained details of the 1998–99 expenditure estimates for spare parts and contract labour. These estimates totalled $28 million for the three principal GS vehicle fleets. Based on the current Regular Army workforce of 560 uniformed mechanics, the ANAO estimated labour costs to be in the vicinity of $45 million. Assuming that 70 per cent of these costs were associated with maintaining the three principal vehicle fleets, the resultant costs would be in the vicinity of $31 million. It should be noted that this estimate probably understates the cost of labour as it does not include all ADF personnel associated with vehicle maintenance activities, eg. non-technical inspection activities, workshop administrative staff, engineering maintenance staff. Therefore, the estimated total cost of maintaining the GS fleet, including the cost of parts, labour and administration, is in excess of $60 million per annum.

5.22 These figures indicate that the ratio of costs of uniformed mechanics to parts / contract labour is slightly greater than 1:1. Using this ratio and other data contained in Defence documents, the ANAO developed an estimate of the approximate annual costs and the cost per kilometre of labour and parts for each of the three fleets. These costs together with the costs based on the Overlander data are shown in Table 4.

Table 4:
Comparisons of fleet operating costs

Vehicle Fleet	*Overlander Data $/km*	*ANAO Estimate $/km*
Perentie	0.57	0.68
Unimog	2.09	1.13
Mack	1.54	0.98

5.23 The ANAO estimates are based on assumptions of which some, in the absence of firm data, may be questionable. However, it is considered that the range between the adjusted Overlander data and the ANAO estimates is broadly indicative of the costs of maintaining the GS vehicle fleets. As such, the figures serve as a broad guide for comparing the cost of maintaining GS vehicle fleets with the maintenance costs of similar commercial vehicles.

5.24 The 11 Brigade trial maintained accurate records of the cost of operating the fleet of commercial vehicles. A commercial contract was established to conduct all repairs, maintenance, recovery and fleet management of the trial fleet. From information obtained during the trial, it was estimated that the cost of operating a fleet of 100 vehicles travelling 15 000 kilometres per year would be $222 000 (excluding depreciation). This figure (which includes the write-off of two vehicles) is the equivalent of 15 cents per kilometre. The ANAO noted that total fleet management costs for the two year period was $376 088, fuel costs were $94 715 and the fleet travelled a total of 2 954 455 kilometres during the trial. This is the equivalent of 16 cents per kilometre for a 4x4 commercial vehicle with performance characteristics broadly comparable to the Perentie 4x4 vehicle.

5.25 The trial report also contained information obtained from a government organisation operating the same type of vehicle in the same geographical area. This organisation had five vehicles which had travelled more than 100 000 kilometres each over a five year period. The organisation was able to provide details of the cost of repairs, servicing and fuel over the life of these vehicles. The average cost over the life of these vehicles was less than 18 cents per kilometre.

5.26 The results of these different analyses indicate that the cost of maintaining the lightweight and light GS fleets is about three to four times that of commercial four-wheel-drive vehicles with similar performance characteristics, while operating in similar terrain. The ANAO was unable to obtain directly comparable data for the medium and heavy trucks. However, based on the limited information that could be obtained it appears that the cost of maintaining the GS trucks would be approximately twice that of broadly equivalent commercial fleets.

Productivity of uniformed mechanics

5.27 One factor that may be contributing to the high maintenance costs for GS vehicles is the comparatively low maintenance time obtained from uniformed mechanics as a result of their involvement in other activities associated with their military duties. Figures obtained from the 3rd Brigade show that in the six months from June to November uniformed mechanics were engaged for less than 50 per cent of their time on maintenance duties. Apart from about 5 per cent for leave the balance of their time was spent on activities associated with their military duties, such as physical training, field exercises, training and courses.

5.28 It appears that the lower maintenance time obtained from military mechanics is also contributing to a significant backlog in vehicle repairs. Data obtained from 3rd Brigade revealed that, in April 1998, there was a

backlog of about 12 000 maintenance hours. The 3rd Brigade is the Army's Ready Deployment Force and is required to maintain a high level of readiness.

5.29 The ANAO acknowledges that it is essential that military personnel give priority to their military duties and that this will impact on their time available for maintenance activities. It is also essential to maintain a core of uniformed mechanics to be available for deployment. However, in view of the greater amount of maintenance time obtained from civilian mechanics it is likely that maintenance costs could be reduced if a higher proportion of civilian mechanics could be employed, especially in base workshops where the likelihood of deployment would not be as great. At 7 CSSB, where civilian contract labour was used, the mechanics were predominantly engaged on mechanical maintenance work and the proportion of time, and, hence, productivity on maintenance activities, was much higher. The ANAO was advised that although the 3rd Brigade sought funding for the employment of civilian mechanics in lieu of vacant military positions, this was not forthcoming.

5.30 There would be benefit in the ADF identifying the minimum number of mechanics required for deployment and examine the feasibility of employing contract civilian labour in lieu of the other military mechanic positions.

Cost of spare parts

5.31 As the existing fleet ages it is almost inevitable that the cost of spare parts will increase and there will be delays in obtaining parts. Because of the smaller number of similar vehicles in general use in the wider community the overall demand for parts used by the vehicles will fall. Over time, this will drive up the unit cost of spare parts and supply lead-times, due to low production volumes and/or the need for retooling by manufacturers. There is also likely to be more unplanned maintenance as vehicles wear out. In addition, there will probably be a change in the consumption of spare parts as components that have previously been reliable commence to fail.

5.32 In a presentation to Defence in November 1998, Rover Australia drew attention to the increasing difficulty of supporting the current Perentie fleet beyond the original life-of-type of 15 years. This presentation outlined the cost of maintaining the fleet and the cost of repair parts. It also indicated that difficulties were likely to occur with procurement of component parts and major service items. The existing engine used by the Perentie fleet is no longer in production, partly because it no longer meets Australian emission standards. Other Perentie engine components have increased in cost by an average of 468 per cent between 1982 and 1998.

5.33 The ANAO was unable to obtain detailed information in respect of spare parts for Mack and Unimog vehicles. However, it was noted that as early as 1988 a report by Defence's Management Audit Branch expressed concern at the escalating prices of Mack and Mercedes spare parts. The report stated that increases of 140 per cent were common in the transition from superseded to new parts. Arising from the concerns expressed in the report, it was proposed that Management Audit Branch and Army combine resources in the conduct of a review of the provision of spare parts. The ANAO is uncertain whether the review was conducted.

5.34 Defence entered into contracts for the supply of repair parts for Mack and Unimog vehicles with the manufacturers in 1996 and 1998 respectively. These contracts guarantee supply of parts for a further five years. The existing contract for the supply of parts for the Perentie fleet will expire in 2000. The ANAO considers that any contract negotiations for spare parts examine the performance of suppliers, especially in respect of price escalation, and seek to ensure appropriate safeguards to avoid excessive increases in prices.

Recommendation No.11

5.35 The ANAO recommends that, to avoid unwarranted expenditure, Defence examine the performance of suppliers, especially in respect of price escalation, in any contract negotiations for the supply of spare parts.

Defence Response

5.36 Agreed. Defence needs to retain the integrity of the original equipment and therefore repair parts are sought from the Original Equipment Manufacturers (OEM). Usually, OEM's will cease manufacturing repair parts between ten to 14 years after the last production run of the major equipment. Therefore, if Defence is going to continue to keep equipment in service for periods of at least 20 years, as is the case for most of the vehicle and trailer fleet, then a premium usually will necessarily be incurred for repair parts. Alternatively, equipment will need to be turned over at shorter intervals or inferior repair parts used.

ANAO Comment

5.37 Although there is often price escalation for spare parts over the life of equipment, the recommendation was directed towards minimising these costs by examining supplier performance as part of the contract renewal process, to ensure that cost increases are reasonable and necessary, to ensure value for money.

Budget issues

5.38 The ANAO examined the levels of maintenance funding proposed for GS vehicles in 1998–99. This funding was primarily for spare parts, tyres and contract labour. The total funds sought and the expenditure allocation are shown in Table 5.

Table 5:
Total funds sought and allocated

Vehicle	*Requirement $ m*	*Allocation $ m*	*Shortfall $ m*
Mack	8.124	5.725	2.399
Other Mdm/Hvy (a)	3.184	3.184	0.000
Unimog	10.504	8.799	1.705
Prime Movers	1.306	1.143	0.163
Trailers	1.841	1.208	0.633
ERL (b)	2.196	0.000	2.196
Other Light (c)	1.557	0.912	0.645
Perentie	14.624	11.673	2.951
Total	**43.336**	**32.644**	**10.692**

(a) includes the Army fire vehicle fleet, medium recovery vehicle, maintenance funding for 26 Transport Squadron and central procurement of tyres.

(b) funding for refurbishment of Mack, Unimog and Perentie vehicles that have exceeded the extensive repair limits.

(c) includes motorcycle and lightweight trailer fleet.

5.39 The table reveals that funds were available to satisfy only 75 per cent of the funds requested. A range of strategies were employed to address the funding shortfall. High readiness units were provided with 100 per cent of the funds requested. Lower readiness units were allocated between 75–85 per cent. Funding of modifications, other than those for occupational health and safety reasons, was restricted, as was funding for engagement of contract labour and the purchase of canopies. It was recognised that these funding allocations would impact on the already limited availability of vehicles, particularly for Reserve units. Although no funds were allocated for the refurbishment of vehicles requiring repairs beyond the extensive repair limit, this requirement was expected to be met by opportunity funding.

5.40 In advising Regional Fleet Managers of the funding allocations the NFM set out the priorities for local repair and maintenance. First priority was to be given to ambulances, fuel and water tankers and fire vehicles, second priority was Support Force and Ready Deployment Force units, third priority was units involved in trials for Restructuring the Army, and fourth and fifth priorities were Training Command units and other Land Command units respectively. The ANAO observed that these

priorities were based on the functions being performed by the vehicles and units rather than on the condition of the vehicles to be maintained.

5.41 In the absence of detailed information on the condition of vehicles, this strategy is reasonable but it does not necessarily allocate funds to the areas of greatest need. Data collected by the Reliability and Maintainability study revealed that, on average, vehicles in high readiness units travelled less distance than vehicles in units located in southern States that were on longer readiness notice. This information indicates that vehicles covering the greatest distances are in units receiving reduced maintenance funds. Distance travelled is not the sole factor influencing maintenance needs but it is an important, measurable, factor. The ANAO acknowledges that vehicles travelling in northern Australia could be operating in more arduous conditions with a higher maintenance requirement. The development of more sophisticated information systems and inspection protocols would be of benefit in assessing the condition of vehicles and the most cost-effective allocation of maintenance funds.

5.42 The ANAO also noted that the budgeted shortfall does not appear to be carried forward to future years. Consequently the impact of budget cuts may be compounding and having a long term detrimental effect on fleet condition and the ability of units to maintain their vehicles at a serviceable level.

5.43 Arising from a series of serious accidents causing death and injury in the early 1990s, an Army Directive was issued in 1994 limiting the carriage of personnel in the rear of GS vehicles. A subsequent study, in 1997, revealed that one of the effects of this instruction had been an overall reduction of 22 per cent in the distance travelled by GS vehicles. In the material examined by the ANAO there was no indication that this reduction has been taken into account in the assessment of maintenance funding needs. In addition, the ANAO noted that there is no direct link between maintenance and operational funding. As a result, it is possible that units may increase the level of their operational activities leading to a greater demand for vehicle maintenance at the same time as there is a reduction in maintenance funding. These two examples illustrate that operational decisions may have a significant impact on support functions, especially equipment maintenance, and there would be merit in ensuring that funding decisions have regard to this relationship.

5.44 The maintenance backlog in the 3rd Brigade was also influenced by a shortage of uniformed mechanics. In March 1998 the Brigade had an approved establishment of 62 mechanics but only 47 personnel, a deficiency of 24 per cent. This shortage was indicative of an overall shortage of mechanics in Army. The ANAO was advised that in September

1998 the approved establishment was 689 but the number of uniformed mechanics was 562—a deficiency of almost 20 per cent. This is in contrast to a surplus of mechanics as recently as 1994. The ANAO was informed of a review of Army personnel establishments that could affect the approved establishment for mechanics.

5.45 Despite the apparent shortage of uniformed mechanics, funding has not been provided to increase the employment of contract civilian labour. Depending on the outcome of the current review of Army's personnel establishment, there would be merit in having regard to the relationship between the availability of uniformed mechanics and the funding for contract labour.

Repair limits and extensive repair

5.46 Due to the limited number of vehicles in repair pools it is generally not possible to provide a replacement vehicle. A report to the Support Commander, in March 1998, noted that the lack of repair pool stocks had resulted in 3rd Brigade, the highest readiness unit, having only 70 per cent of its Perentie fleet available. Similarly, a shortage of loan pool vehicles has limited the ability of Reserve units to conduct driver training. Army has taken action to address these deficiencies through the provision of commercial vehicles for non-operational and low priority tasks. Also, funding has been provided to the South Queensland Logistics Group to carry out extensive repairs and refurbishment of GS vehicles that might otherwise have been deemed unrepairable.

5.47 Army has determined One-Time Repair Limits (OTRL) that are used as management indicators to assist in identifying whether an item of equipment should be repaired or offered for disposal. The OTRL for vehicles is expressed as labour hours and limits the resources that may be applied at any one time in the life of the equipment. At the commencement of each financial year the NFM provide Regional Fleet Managers with a Fleet Management Brief which contains guidance on the management of GS vehicles. This brief includes the OTRL for each of the major variants in the GS fleet.

5.48 In addition to the OTRL, which is a specified number of hours that decrease with the age of the vehicle, the NFM also advise extensive repair limits for the major vehicle types in the GS fleet. For 1998–99 the extensive repair limit for Mack and Unimog vehicles was $20 000 and for Perentie vehicles, $15 000. Details of vehicles requiring repair in excess of the extensive repair limits were to be referred to the NFM for a decision on the repair or disposal of the vehicle. Due to the shortage of GS vehicles, unit or pool vehicles requiring repairs in excess of OTRL or extensive repair limits are frequently not replaced.

5.49 Vehicles beyond the OTRL or extensive repair limit are normally transferred to the South Queensland Logistics Group, which has been provided with resources to carry out major repairs. The NFM will decide whether vehicles will be repaired as part of the Extensive Repair Line at the South Queensland Logistics Group having regard to the following factors:

- the age of the equipment;
- the cost-effectiveness of the OTRL;
- whether the item is in scarce supply;
- whether the item is on the mission essential item list;
- the lead-times for replacing the equipment; and
- the in-service date of replacement equipment.

5.50 The OTRL is only a guide and the NFM may approve repair beyond the stated OTRL. At all times cost must be weighed against the potential impact of losing the particular item from the inventory.

5.51 The ANAO examined Defence data on the cost of refurbishing vehicles on the Extensive Repair Line during 1997–98. The total cost shown was $3.821 million for 61 vehicles: an average cost of $62 640. However, the ANAO noted that these figures included direct labour costs only and excluded overheads. Table 6 shows the average cost for each of the vehicle types recalculated using full labour costs.

Table 6:
Extensive Repair Line average cost of repair (including full labour cost)

	Average Cost
All vehicles	$75 400
Perentie	$55 950
Unimog	$98 310
Mack	$76 904

5.52 The ANAO is uncertain whether these figures represent the full costs of refurbishment of the vehicles, especially for Mack vehicles, as in most cases the labour cost averaged only $1274 while the cost of spare parts averaged $75 630 per vehicle. However, such assessments raise some doubt about the cost-effectiveness of the Extensive Repair Line activity. Although the cost of the Perentie repairs is significantly less than the value of similar GS vehicles (if they were available), it is more than the cost of a new commercial vehicle with similar performance characteristics. The same comment can be made about the Unimog.

5.53 Earlier in this report the ANAO noted the substantial gap between vehicle entitlements and actual assets. It also raised some issues concerning the accuracy of the data used to determine the extent of this gap. At the same time, it is aware that, for some variants, the shortage of vehicles may have a serious impact on operational capability. The report also discussed the life-of-type of the existing fleets and the need to assess the timing of replacement fleets. The possibility of using commercial vehicles in lieu of GS vehicles in certain circumstances was also raised. Data are also available that indicate there are major differences in the distances travelled by GS vehicles. There could be scope for greater rotation of vehicles to ensure that higher readiness units receive priority for vehicles in good condition.

5.54 Having regard to all of these factors the ANAO considers there is a need to examine the cost-effectiveness of the Extensive Repair Line. Such an examination would need to include:

- an accurate assessment of the full costs of the repairs;
- the longer term supportability of the equipment, eg. the availability of repair parts;
- an estimation of the additional life of the vehicles following refurbishment;
- consideration of the likely timing of the replacement of the existing fleet;
- the necessity for equipment to be refurbished;
- the scope for the use of commercial vehicles in lieu of GS vehicles; and
- the potential for rotating the vehicle fleet to ensure that high readiness units receive priority in the allocation of vehicles in good condition.

5.55 In the Capability Proposal (Land 121) arising from Project Overlander a range of capability options to maintain and enhance the ADF's current field vehicle and trailer fleet was proposed. One of the major options was a life-of-type extension involving expenditure of between $25.3 million and $44.2 million to upgrade Unimog and Mack trucks. The least-cost option involved a life-of-type extension for 400 Unimogs at a cost of $25.3 million (an average cost of $63 250). In view of the ANAO's calculation that the average cost of the extensive repair of Unimog trucks was $98 310, it would be appropriate to review the costing contained in the Capability Proposal.

Recommendation No.12

5.56 The ANAO recommends that, to help avoid unnecessary repair costs and unnecessary delays in vehicle availability, Defence examine the cost-effectiveness of the Extensive Repair Line taking into account factors such as the assessment of its full cost, estimation of the additional life of the vehicles and whether the vehicles being refurbished are actually needed.

Defence Response

5.57 Agreed. The Extensive Repair Line is currently returning vehicles to service that would normally be written off, so as to fill capability shortfalls. This is being achieved at a cost less than the full cost replacement value of the vehicle.

ANAO Comment

5.58 The Extensive Repair Line is expensive relative to the cost of new commercial vehicles with similar performance characteristics. Capability requirements, and therefore shortfalls, need to be revisited before judgements can be made on the cost-effectiveness of the Extensive Repair Line.

Mack Wrecker being used in the testing of the Perentie rollover cage

6. Vehicle Safety

This chapter provides an overview of the issues relating to vehicle safety. It highlights the need for a sound cost-benefit analysis prior to undertaking significant modifications to in-service GS fleets; the need for improved accident data; and to introduce measures to avoid the overloading of vehicles.

Background

6.1 The *Occupational Health and Safety (Commonwealth Employees) Act 1991* provides a legal basis for the protection of the health, safety and welfare of all Commonwealth employees, including all military and civilian Defence personnel, contractors and visitors. The legislation also emphasises the rights of all involved parties to information, consultation and, where imminent serious Occupational Health and Safety (OH&S) risks are perceived, to cause intervention measures to be invoked to ensure workplace safety.

Duty of care

6.2 The legislation establishes a duty of care owed by all parties, including employers, supervisors, employees, contractors and suppliers. Duty of care is the legal obligation to avoid causing harm to another person, especially through negligence. The Act imposes on commanders, managers and employees both a general duty of care and specific obligations in respect of workplace health and safety. Specific obligations imposed by the Act are intended to ensure that foreseeable, potentially harmful consequences are systematically identified and avoided.

6.3 Under OH&S legislation in each State and Territory, all employers have a legal obligation to ensure 'as far as is reasonably practicable' the health and safety of their employees. Although this legislation does not set out specific requirements for vehicle fleet safety, its general obligations can be reasonably understood to cover vehicles being used in many situations. It is the employer's duty, by law, to provide employees with:

- safe workplace locations and plant equipment such as vehicles;
- information, instruction, training (eg. driver training) and supervision necessary to enable employees to perform their work safely; and
- safe systems of work, for example schedules and accident reporting mechanisms.

6.4 Clearly, what constitutes a safe workplace will vary but the legal onus is still on the employer to justify that.

SCOT study

6.5 Monash University Accident Research Centre undertook, on behalf of the ADF, the Safe Carriage of Personnel in GS Vehicles study (known as the Safe Carriage of Troops / SCOT study) late in 1997–98. The SCOT study followed on from the work of Defence's Project Transafe (see below). The study was commissioned with the objective of providing the ADF with the basis and framework to formulate and implement a practical policy for GS vehicle usage, addressing legal, policy, engineering, investigative and training issues. It outlined possible options to modify the current fleet to improve the safety of personnel travelling in the back of the vehicle.

6.6 The SCOT study made recommendations relating to policy, accident investigations, accident databases, driver training and engineering changes. At the time of the audit Army Headquarters had accepted responsibility for further action in respect of the recommendations. Because of their funding implications the adoption / implementation of the Study's recommendations will require the approval of senior Defence committees.

Safety issues

Carriage of personnel

6.7 One of the tasking capabilities outlined in the Major Equipment Submission for the four primary families of GS vehicle (Perentie 4x4, Perentie 6x6, Unimog and Mack trucks) is the ability to carry numbers of personnel in the back of the vehicles. During 1992–93 accidents involving GS vehicles resulted in death and serious injury to members of the Australian Army. Subsequently, Army initiated Project Transafe, a study of troop transportation practices. Data analysis for GS vehicles showed that most serious injuries and fatalities to ADF personnel result from rollovers of Perentie 4x4 and Unimog vehicles. Project Transafe sought to reduce the crash risk and injury severity risk relating to the carriage of troops in the rear of GS vehicles. It was limited in its application as it did not include the necessary evaluation or justification required for implementation of the engineering solutions.

6.8 A direct result of Project Transafe was the development of the Chief of General Staff (now Chief of Army) Transafe Directive 1069 / 94 issued in October 1994, which replaced a direction issued in March 1994. The Transafe Directive was subsequently replaced by Defence Instruction (General)—Personnel 19–6 (DI(G)Pers 19–6) in August 1996. The initial Army Directive and the subsequent DI(G) were the primary response to the ADF's 'duty of care' responsibility.

6.9 DI(G)Pers 19–6 outlines a series of requirements governing the movement of unrestrained personnel in military vehicles and distinguishes between various categories of movement; ie. operational, training and administrative. It also outlines the extent of application to non-ADF personnel and specialised activities. In general terms unrestrained movement of personnel is limited to short duration, low speed travel within specified areas. However, unrestrained movement is authorised for essential training movements within prescribed limitations; eg. distances no greater than 250km or three hours travel. The intent of the policy is to eliminate unnecessary exposure to risk; unrestrained movement should be considered only when there is no practicable, safer means available. Individual unit commanders issue unit directives for the implementation of this DI(G) policy within their commands. However, the instruction is capable of differing interpretations that have the potential to circumvent the policy intent. The ANAO found that some commander directives were focused more heavily on risk minimisation than others.

6.10 The SCOT study found that the policy instruction had significantly altered GS vehicle usage. It had resulted in reduced exposure to the unrestrained carriage of personnel and fewer serious injury or fatality accidents (incidence more than halved) since it was introduced in 1994. However, the rate of accidents had not altered significantly.

6.11 The Army Engineering Agency (AEA) is in the process of developing engineering solutions for rollover protection and personnel restraint systems. The standard for rollover protection used by AEA in their design analysis is considered by Rover Australia to be one of the most stringent in the world. Passenger seating arrangements in most of the GS vehicle fleets is sidewards facing. It has been shown that the carriage of sidewards facing personnel increases the risk of injury in the case of an accident. AEA is in the process of trialing seating modules which can be fitted to the GS fleets to overcome this situation.

6.12 The SCOT study contained a cost-benefit analysis of various risk reduction options based on an anticipated 20 year life of the existing GS fleet. Option one was estimated to reduce serious injury by 80 per cent and would cost $73 million. Option two would cost $53 million for an estimated reduction of 70 per cent. Option three would cost $40 million and would reduce the risk of serious injury by 50 per cent. Engineering changes and policy modifications were expected to have the most beneficial effects. Two variants of the Perentie 4x4 vehicle were considered to have the highest risk rating. The study noted that since the late 1980s there had been a trend in the motor vehicle industry for both increased occupant protection and enhanced vehicle handling.

6.13 The ANAO observed that the possible engineering modifications would involve significant capital cost and that they are proposed to be implemented on vehicles which have already reached their original life-of-type.

Vehicle handling and stability

6.14 The handling and stability of the Perentie fleet has been an issue under consideration by Defence since shortly after its introduction into service. These concerns resulted in a number of actions being taken to reduce both crash and injury risk. It was recognised that drivers needed transition training to reduce the risk of accidents.

6.15 Other factors affecting the handling of the vehicle are tyre type and pressure. It appears that Defence may not have taken full advantage of improvements in tyre technology.

6.16 The question of the Perentie handling and stability have been the subject of numerous discussions and technical investigations since 1989. Despite this work there has been no clear resolution or agreement that there is an inherent safety problem with the vehicle. However, as a result of intensive testing by AEA, Land Rover in Australia and Britain and by Defence's Project Bushranger, a package of suspension modifications has been proposed to provide significant improvement of the vehicle's handling without detracting from the cross country performance.

6.17 In looking at this issue the SCOT study concluded "as there is still lack of unanimity on what the appropriate and sufficient suspension upgrades should be, resolution of this dispute would appear to require nothing less than the formation of an expert panel." The ANAO considers that the experience gained from the considerations of an expert panel, in the assessment of handling characteristics, would be of benefit in future vehicle acquisitions.

6.18 Once a decision has been made on the suspension upgrades, approval for funding is likely to be sought. Similarly, implementation of modification for rollover protection and personnel restraint systems will also involve significant expenditure. As the vehicles concerned are already at the original planned life-of-type and may soon experience supportability problems, the justification for expenditure on these vehicles would need to be carefully considered. The ANAO notes that approvals of this nature are often a complicated process and take many years of planning until they are catered for in the Defence Budget. As the matter of the stability of the Perentie vehicles has been under review for about 10 years the ANAO considers that action should be commenced to resolve this issue as soon as possible.

6.19 Given the age of the Perentie fleet and the time it would take to test the modifications and then adapt the vehicles, the ANAO considers the cost-effectiveness of any changes should be carefully assessed. Other options such as the greater use of commercial vehicles (appropriately modified if required) should also be considered. The timing of replacement of the existing fleet would be an important consideration in any funding decision.

Recommendation No.13

6.20 The ANAO recommends that, to make better use of scarce funds, Defence examine the cost-effectiveness of any proposed modifications to the current GS fleet, giving consideration to factors such as increased use of commercial vehicles, amendments to operating procedures and pending decisions on fleet replacement.

Defence Response

6.21 Agreed. There is a need to examine the cost-effectiveness of any proposed modifications to the current GS fleet to gain the most from scarce funding. There is also a need to consider the safety of the personnel operating these vehicles in extreme environments as well as the safety of the general community that may come in contact with these vehicles and trailers on public roads.

Vehicle and trailer compatibility and trailer safety

6.22 As mentioned earlier in this report, a Trailer User Group (TUG) was established in 1991 to examine and report on the Army GS trailer fleet.

6.23 In its 1992 report TUG identified a number of problems with the trailer fleet, some of which had safety implications. The report noted that in development of projects to acquire trailers there was low priority on compliance with Australian Design Rules, particularly for trailer brakes, resulting in unsafe trailers. It also noted that wheel base widths should be designed to match the width of the towing vehicle to eliminate unsafe tracking. In response to that report, the Engineering Development Establishment (now AEA) commented that it was only aware of problems of compatibility of the ½ ton (lightweight) trailer with the Perentie Land Rover that resulted in poor tracking of the trailer in soft ground. It was also aware of problems associated with excessive vertical bounce during cross country operations.

6.24 Most trailers in service are between 27 and 40 years old. Originally, the intention was to match trailers with current in-service vehicles. However, as the trailers have been in service for a significant time and in

most cases the towing vehicles have been changed, this compatibility no longer exists. In some cases this may lead to a safety problem.

6.25 State road regulations state that a laden trailer, without fitted brakes, is not to exceed a maximum weight of 750kg. Trailers manufactured prior to 1988 are exempt; eg. the ½ ton (lightweight) trailer may have 860kg gross trailer mass. The ANAO was informed that Defence trailers are frequently overloaded. This is likely to cause damage to the trailer's towing frame and suspension and may also represent a safety risk.

6.26 Although the terms of reference and findings of the SCOT study were comprehensive, the study did not analyse the impact of trailers coupled with vehicles in the accident statistics. The ANAO examined a sample of reports from the Military Motor Accident Database and found that trailers had been involved in a significant number of accidents contained in the database, in some cases contributing to rollovers. The ANAO considers that the impact of trailers on the safe carriage of personnel should be examined in any follow-up to the SCOT study.

Timeliness of addressing safety issues

6.27 Where the need for vehicle engineering modifications (EMEI's) is classified as Group One (which include safety issues), they must be implemented into the fleet immediately. The Maintenance Advisory Service inspects and checks (every one, two or three years depending on the unit's priority), a sample of vehicles to ensure that all EMEI work has been implemented / undertaken.

6.28 Additionally, the Maintenance Advisory Service has often found that critical safety maintenance was not being regularly undertaken to rectify deficiencies such as twisted and / or frayed seatbelts and contaminated brake and clutch hydraulic systems. As these issues are not being routinely identified by unit inspections, it is likely that they are not being rectified in a timely fashion.

6.29 When a significant safety issue is identified, the equipment, depending on the immediate risk, is grounded, restricted to limited tasking or continues to be in-service until the issue is further investigated. In many instances an engineering solution is developed and the problem is resolved. However, the ANAO noted cases where the problems were longstanding.

6.30 An example of a problem that has not been resolved concerns the crane on Mack vehicles. The cranes were being overloaded and the welded areas along the jib plates were failing. Problems relating to the potential

overloading of the crane were identified soon after its introduction into service in 1983. There are a range of Australian Standards and Engineering Instructions covering cranes that have to be observed in reaching a solution to the problem. AEA has been working on computer modelling of the crane and a proposal has been put forward to test and develop a Load Management System (LMS) which protects the crane against overload. No decision has been made on whether to replace the crane or equip it with an LMS.

6.31 A further example relates to the recovery equipment on the Mack Heavy Wrecker (Mack wrecker). The vehicle is now some 13 years into its life-of-type and in this time has experienced a steadily increasing series of failures and problems with its recovery equipment. The failure of the winch safety brakes and problems with winch cut-outs have placed operators in dangerous situations. As a result of two separate winch brake failures in late 1994/ early 1995, the then Chief of General Staff directed that restrictions be imposed on the Mack wrecker for operator safety. Attempts to modify the vehicle were found not to be viable.

6.32 In 1997 Land Headquarters advised that the restrictions imposed on the use of the Mack wrecker had reduced its capability by 45 per cent. Funding for a replacement capability is expected to be approved in 1999–2000 for acquisition in 2000–01 through Project Overlander.

6.33 The situation regarding the stability of the Perentie discussed above was originally raised in 1989. The vehicle tasking has not been limited to prevent any accident while further investigation is taking place. Given the time it has taken to resolve these issues, it seems likely that by the time a satisfactory resolution has been found and trialed the fleet would have exceeded its current life-of type and the cost-benefit of implementing changes would need to be carefully examined. Similarly, safety issues identified by the TUG in 1992 have not been resolved.

6.34 The ANAO recognises that many safety issues are addressed promptly, but is concerned with the time taken by Defence to resolve issues involving vehicle safety where the solution may involve significant expenditure or complex engineering solutions. In many instances, the problems are identified early in the life of the equipment but there does not appear to be a process to ensure that action to resolve the problem occurs within a reasonable timeframe. It is noted that, in most cases where a major delay occurs in developing a solution, considerable effort is expended, but there are difficulties in defining the problem and determining possible solutions.

Driver training

6.35 Prior to being able to drive a GS vehicle, personnel must undertake extensive driver training and satisfy requirements of the ADF licensing system. Under section 123 of the *Defence Act*, an ADF member does not require a civilian driving licence to drive an ADF vehicle on public roads. However, all ADF drivers must be in possession of their ADF driving licence whenever on duty. An ADF driver's licence is issued only on the successful completion of competency-based training. Continuation (conversion) driver training is required for licence endorsement of additional or specialist vehicles. This is done on a decentralised basis in regions, on bases and on stations. Additionally, a familiarisation course is required to be undertaken before being allowed to drive a different variant of the same vehicle, due to the different load distributions and resultant handling variations.

6.36 It is crucial that such conversion training takes place. It is understood that only limited training occurred with the introduction of the Perentie 4x4 which replaced the Land Rover Series Three. The vehicles, though from the same manufacturer, had different capabilities and handling characteristics. As a result of accidents occurring following the introduction of the new vehicles, Defence conducted investigations which revealed that, although familiarisation training was considered to be well planned, it was not effectively implemented. It was reported that a significant proportion of drivers did not receive formal familiarisation training. Even experienced drivers were involved in accidents while driving the new vehicle.

6.37 Driver training for all vehicles is extensive but generally undertaken in a controlled environment with vehicles being either empty or loaded to the manufacturer's limits. The ANAO found that units frequently overloaded their vehicles and trailers. Overloading the vehicle and trailer alters the handling and stability of the vehicle. Drivers therefore do not have the necessary skills to handle excessively loaded vehicles. Overloading the vehicle has the potential to cause axle and chassis problems, including premature failure. Exceeding the maximum allowable loading is dangerous, illegal and results in increased maintenance costs. It also impacts on the potential life of the vehicle as it is not designed to carry the increased loads. The ANAO considers that Defence should develop measures to avoid the overloading of unit vehicles eg. load limits need to policed and substantial penalties issued to deter personnel from this practice.

6.38 The ANAO recognises that speed is a major factor contributing to motor vehicle accidents and that training should reinforce this fact. The SCOT study noted that the ADF captures limited data on the speed

involved in vehicle accidents. The data captured is based on estimations by the driver and therefore only indicative.

6.39 The SCOT study included a range of recommendations directed at improving the quality of ADF driver training. The ADF is currently considering its response to these recommendations. In addition to the SCOT recommendations, the ANAO considers that, in examining current training methods, the ADF should give attention to the significant use of trailers with GS vehicles and the evidence that vehicles are being overloaded.

Recommendation No.14

6.40 The ANAO recommends that, to promote safety and avoid unnecessary accidents, Army develop measures to avoid overloading unit vehicles, such as the use of vehicle weigh scales and more extensive policing of load limits.

Defence Response

6.41 Agreed. As for Recommendation 2, the safety issue will be addressed in the short term through a policy directive that vehicles and trailers are not to be overloaded. Vehicle and trailer load limits are taught on all drivers' courses.

Incident reporting and recording

6.42 For the Army, the basic vehicle accident reporting requirements are set out in Standing Orders for Vehicle Operators, including those specified in DI(A)Admin 23–2: Reporting and Investigation of Incidents. These documents require investigation of all accidents and completion of an accident report form which is dispatched to the Directorate of Defence Occupational Health and Safety (DDOHS) for entry into the motor vehicle accident database on completion of the investigation, or within three months, whichever is earlier.

6.43 When a serious traffic accident occurs, the unit concerned is to inform its superior headquarters immediately and, if practicable, appoint an officer to attend the scene. Accident investigations are categorised as formal or informal and are carried out at unit level. Accident reporting is also decentralised. An informal investigation involves an oral or written report, but the circumstances are such that the appointment of a formal investigation officer is not considered warranted. Formal investigations are typically conducted for more severe crashes, or where additional clarification of accident details are required. These require appointment of an investigating officer with a formal Instrument of Appointment and Terms of Reference.

6.44 DDOHS, within the Personnel System Information Management Branch of the Defence Personnel Executive, is responsible to the Chief of the Defence Force for the formulation and promulgation of OH&S policy in the ADF. This includes the coordination of statistical information relating to accidents and dangerous occurrences, the analysis of data and the issue of ADF policy.

6.45 The accident / incident reports from unit level are centrally entered into two ADF accident databases which are the responsibility of the DDOHS. The Military Motor Accident Database (MMAD) includes information about motor vehicle crashes of all severity levels (including non-injury) involving Army vehicles. The OH&S database includes all work-related injuries for Service and civilian employees of Defence. A new version of the OH&S database is being developed and implemented (the DEFCARE database).

6.46 The SCOT study found significant limitations in the Defence accident reporting databases regarding data quality, coverage and the suitability of data for use in targeted injury prevention programs. In particular, it was critical of the lack of information relating to non-military vehicles or personnel involved in accidents and of any recommendations from the Unit Motor Transport Office. They were also concerned at the absence of a mechanism to check that all accident data forms had been submitted.

6.47 The ANAO was informed that, although technical inspections were carried out after an accident, there is no provision for the data contained in these technical inspection forms to be entered into the MMAD. Analysis and reporting of accident data rely heavily on the quality of the data in the system. If the data are incomplete, it is impossible to determine trends accurately for better management.

6.48 The technical inspection information would be valuable from a repairs and maintenance / national fleet management perspective. This would enable diagnosis, on a systematic basis, of technical factors contributing to accidents and trends in vehicle failures and provide a sound basis for preventive action to be taken. The ability to run reports on accident trends would also be a valuable fleet management tool. If the database is to be of value it should be current and relevant. It is also important that resources be available to undertake the necessary analyses.

Recommendation No.15

6.49 The ANAO recommends that, to assist in the diagnosis of vehicle failures and trends, Defence modify the Military Motor Accident Database to include technical inspection data relating to accidents.

Defence Response

6.50 Agreed. Several initiatives aimed at facilitating a joint analysis of information on accident, incident and technical databases are currently being examined. The review is scheduled for completion by the end of 1999.

Costs of accidents to Defence

6.51 In addition to the legal reasons associated with the need for safety of the GS vehicle fleet, economic costs should also be considered. The direct and indirect costs of GS vehicle accidents are estimated in the SCOT study to be in the order of three million dollars per annum (using civilian cost data). The ADF data available to develop these real costs was inconsistent and largely inadequate.

6.52 Identifiable costs to the Commonwealth include vehicle repairs, lost wages, medical and hospital bills, rehabilitation and workers compensation payments. These would normally be referred to as insured costs but in the case of GS vehicles the Commonwealth is its own insurer.

6.53 Hidden costs are perhaps more important than insured costs because they tend to be more numerous than the above costs and potentially larger. Indirect costs of vehicle accidents include the cost of lost time and productivity, replacement staff and vehicles (if they are available from the repair pool), payments to the injured person, first aid, transport and possibly legal fees. An increase in fleet safety is an area where significant amounts of money can be saved.

Legislation and safety instructions

6.54 The major legislation that impacts on the in-service GS vehicle fleet includes the *Defence Act 1903*; the *National Road Transport Commission Amendment Act 1998*; the *Motor Vehicle Standards Act 1989*; the *Occupational Health and Safety (Commonwealth Employees) Act 1991*; and Northern Territory Traffic Regulations. Additionally there are a range of Defence instructions and regulations relating to GS vehicle operation, such as Standing Orders for Vehicle Operators (vol 2), the Movement of Personnel in the rear of GS vehicles (DI(G)Pers 19–6) and Driver Training in the Defence Force (DI(A)Pers 23–2). Further, the ADF has common law liability for negligence in civilian-like activities.

6.55 Section 123 (Immunity from certain State and Territory laws) of the *Defence Act 1903* provides that, where certain specific conditions are met, a member of the ADF is not bound by a State or Territory law. The section does not allow the ADF to disregard any State or Territory legislation and stringent conditions must be satisfied before the ADF gains exemption from the law.

6.56 ADF transport tasking and applications involving in-service GS vehicles should comply with the National road transport legislation. Subsection 123(1) of the *Defence Act 1903* does not automatically exempt the ADF from this legislation. In response to the recent changes in road transport legislation members of the ADF, in conjunction with other key organisations, are working to develop operator guidelines for the conduct of ADF road transport activities. The purpose of these documents is to detail guidelines for the conduct of day-to-day road transport activities, particularly over-mass and over-dimension movement, on public roads throughout Australia by the ADF. It also provides guidance on the circumstances when an exemption may be sought.

6.57 The *Motor Vehicle Standards Act 1989 (C'wlth)* provides the legislative basis for Australian Design Rules (ADR) which set uniform standards in the areas of vehicle safety and emissions. ADR are not applied retrospectively, which means that typically they are only applicable to new vehicles. Thus there is no requirement for existing vehicle owners to upgrade their vehicles to comply with new ADR. The view is that as old vehicles are replaced with new vehicles, the bulk of the Australian fleet will become compliant over time. But because Defence GS vehicles are kept for so long this normal process of renewal does not occur unless retrofitting of upgrades are specifically sought.

6.58 In the SCOT study a manual, developed by the Federal Office of Road Safety, the National Road Transport Commission and the bus industry, to provide improved occupant protection was discussed. This manual provided guidelines for retrofitting improved seats, seat anchorages and seat belts to existing bus fleets and recommended that "a coach be modified to the highest level of safety improvement practical for its age, vehicle model and seating type, as well as its end use."[11] The same principles could be applied to Defence's GS vehicles.

6.59 The ANAO concludes that consideration should be given to modifying GS vehicles to accord with current ADR (eg. the fitting of brakes to trailers), if the GS fleet is to remain in service beyond its original life-of-type.

6.60 Regulation 99A of the Northern Territory Traffic Regulations makes it an offence for a person to drive a vehicle that has a person in a load space that is not enclosed. The Commonwealth was granted an exemption from this regulation in respect of ADF vehicles being used 'while the vehicle is engaged in military activities.' This exemption was dated 18 May 1994 and continues in effect to 31 December 1999.

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[11] Monash University, Safe Carriage of Personnel in GS vehicles study, Working Paper 9.

Alternative measures or renegotiation is required prior to the present exemption expiring. The Western Australia government is considering the introduction of a measure similar to that operative in the Northern Territory.

6.61 As discussed above, section 123 of the *Defence Act 1903* gives Defence immunity from certain State and Territory laws. However, an important issue that needs to be addressed by Defence is the appropriateness of it seeking immunity from regulations developed with the objective of improving passenger safety.

Canberra ACT
24 May 1999

P.J. Barrett
Auditor-General

Appendices

Appendix 1

General Service Vehicle Numbers by Variant

	Peacetime Liability					Current assets				Deficiency/ Surplus	
Variant	*FTE*	*LC / LR*	*RP*	*Total*	*Units*	*LC / LR*	*RP*	*Other*	*Total*	*Qty*	*%*
Truck Ltwt (4X4) (Perentie)											
Cargo	713	470	225	1408	737	386	52	20	1195	-213	-15
Cargo W/Winch	178	115	55	348	151	76	9	3	239	-109	-31
FFR	690	293	177	1160	690	213	24	14	941	-219	-19
FFR W/Winch	200	65	46	312	167	4	1	1	173	-139	-45
Panel Survey FFR W/Winch	25	4	5	33	32	0	0	2	34	1	2
Carryall S/Cmdr FFR	13	1	2	16	10	0	0	0	10	-6	-39
Carryall Personnel	19	10	5	35	22	10	5	1	38	3	10
Surveillance FFR W/Winch	7	0	1	8	0	0	0	0	0	-8	-100
Surveillance W/Winch	200	6	32	238	202	2	16	17	237	-1	0
Total	***2045***	***964***	***548***	***3557***	***2011***	***691***	***107***	***58***	***2867***	***-690***	***-19***
Truck Lt (6X6) (Perentie)											
Ambulance 4 Litter FFR	79	26	18	124	86	4	2	1	93	-31	-25
Cargo W/Winch	53	16	12	80	29	2	23	2	56	-24	-30
Cargo	203	88	53	344	128	63	9	28	228	-116	-34
ERV	44	12	10	66	38	0	2	0	40	-26	-39
GMV	197	58	44	299	168	5	10	1	184	-115	-38
LRPV	20	0	3	23	20	2	0	5	27	4	17
Air Def FFR W/Winch	50	9	10	69	57	1	4	0	62	-7	-10
Crew Cab W/Winch	20	0	3	23	22	1	2	1	26	3	13
Comsec Repair Wksp Veh	11	0	2	13	11	1	0	0	12	-1	-5
Total	***677***	***209***	***154***	***1040***	***559***	***79***	***52***	***38***	***728***	***-312***	***-30***

	Peacetime Liability					Current assets				Deficiency/ Surplus	
Variant	*FTE*	*LC / LR*	*RP*	*Total*	*Units*	*LC / LR*	*RP*	*Other*	*Total*	*Qty*	*%*
Truck Cargo Mdm (Unimog)											
Cargo W/Winch	380	171	100	651	344	122	13	3	482	-169	-26
Cargo	992	494	272	1759	824	220	64	11	1119	-640	-36
Cargo W/Crane	186	90	50	326	139	27	8	1	175	-151	-46
Dump W/Winch	51	26	14	91	42	35	9	0	86	-5	-5
Dual Cab	5	1	1	7	6	0	0	0	6	-1	-17
TPA	8	1	2	11	19	4	3	0	26	15	143
Total	***1622***	***784***	***439***	***2845***	***1374***	***408***	***97***	***15***	***1894***	***-951***	***-33***
Truck Hvy 8 Tonne (Mack)											
Cargo	89	33	22	144	90	53	17	4	164	20	14
Cargo W/Winch	37	11	8	56	47	29	2	2	80	24	43
Cargo W/Crane	69	29	18	116	60	19	7	2	88	-28	-24
Dump	66	70	27	163	69	63	55	4	191	28	17
Dump W/Winch	45	28	14	87	39	23	13	0	75	-12	-14
Tank Water (TTW)	42	32	14	89	30	17	1	0	48	-41	-46
Tank Gasoline (TTF)	50	32	16	98	34	0	1	0	35	-63	-64
Wrecker FFR	80	24	18	122	78	11	8	2	99	-23	-19
Gun Tractor / Ammo Hvy	34	13	8	56	37	18	7	2	64	8	15
Rem Cab	39	16	10	65	28	0	1	0	29	-36	-55
Rem Cab W/Winch	22	19	8	49	14	0	2	0	16	-33	-67
Distributor Bituminous Truck	2	2	1	5	0	0	8	0	8	3	51
Mack Concrete Mixer	0	1	0	1	1	4	1	0	6	5	700
Total	***575***	***311***	***164***	***1050***	***527***	***237***	***123***	***16***	***903***	***-147***	***-14***

Variant	Peacetime Liability					Current assets				Deficiency/ Surplus	
	FTE	LC / LR	RP	Total	Units	LC / LR	RP	Other	Total	Qty	%
Truck Tractor & Semitrailers											
Truck Tractor Hvy W/Winch	9	0	1	10	0	0	0	0	0	-10	-100
International Prime Mover	77	13	15	104	79	4	1	2	86	-18	-18
Total	***86***	***13***	***16***	***115***	***79***	***4***	***1***	***2***	***86***	***-29***	***-25***
Semitrailer Lowbed Tank Tpt	3	0	0	3	0	0	0	0	0	-3	-100
Semitrailer Tank Water	3	0	0	3	5	0	0	1	6	3	74
Semitrailer—Cargo 12.5 Mtr	68	2	11	81	67	2	0	0	69	-12	-15
Semitrailer Tank Fuel	3	4	2	9	7	0	0	2	9	0	3
Semitrailer Tank/Plant Tpt	40	8	8	57	34	6	0	2	42	-15	-26
Total	***114***	***15***	***21***	***150***	***113***	***8***	***0***	***5***	***126***	***-24***	***-16***
Dolly Converter Semitrailer	32	4	6	41	32	1	0	0	33	-8	-20
Dolly Converter Tank/Plant	38	4	7	48	34	6	0	2	42	-6	-13
Total	***70***	***7***	***13***	***90***	***66***	***7***	***0***	***2***	***75***	***-15***	***-16***
1/2 Ton Ltwt Trailers											
Flatbed	0	2	1	3	0	0	0	0	0	-3	-100
Cargo	1997	916	528	3441	1424	411	20	26	1881	-1560	-45
Water	106	62	32	200	1	0	1	1	3	-197	-98
Cable Reel	0	2	0	2	0	0	0	0	0	-2	-100
Chassis	3	0	0	3	0	0	0	0	0	-3	-100
Shop Equipment	109	1	17	126	27	1	3	1	32	-94	-75
Store Binned	5	2	1	9	3	0	0	0	3	-6	-66
Small Arms Rep	2	0	0	2	0	0	0	0	0	-2	-100
Machine Shop	3	0	0	3	0	0	0	0	0	-3	-100
Total	***2225***	***985***	***580***	***3790***	***1455***	***412***	***24***	***28***	***1919***	***-1871***	***-49***

	Peacetime Liability					Current assets				Deficiency/ Surplus	
Variant	*FTE*	*LC / LR*	*RP*	*Total*	*Units*	*LC / LR*	*RP*	*Other*	*Total*	*Qty*	*%*
1Ton/Tonne Lt Trailers											
Cargo 1 Tonne	612	313	170	1095	207	39	6	1	253	-842	-77
Chassis Trailer	85	6	14	105	99	3	13	6	121	16	15
Cable Reel	5	2	1	8	5	0	0	0	5	-3	-38
Total	***702***	***321***	***186***	***1209***	***311***	***42***	***19***	***7***	***379***	***-830***	***-69***
21/2—8 Tonne Med Trailers											
Cargo Mdm 2 1/2—3 ton	149	156	61	366	32	0	12	4	48	-318	-87
Lowbed Forklift Tpt Medium	6	1	1	8	1	0	0	0	1	-7	-87
Cargo Mdm 8 tonne	380	45	68	493	328	36	7	12	383	-110	-22
Total	***535***	***202***	***131***	***867***	***361***	***36***	***19***	***16***	***432***	***-435***	***-50***
Heavy Trailers											
Flat Hvy Tilt Platform	0	0	0	0	32	2	10	2	46	46	
Mdm Plant Tpt Hvy	56	19	13	88	71	13	0	0	84	-4	-5
Flatbed Rough Terrain 20 ton	8	0	1	9	12	0	0	0	12	3	30
Hvy Recovery	42	8	8	58	48	9	4	2	63	5	9
Total	***106***	***27***	***23***	***156***	***163***	***24***	***14***	***4***	***205***	***49***	***31***
Motorcycles											
Road Military Police	28	8	6	42	29	12	6	2	49	7	17
Patrol	320	97	72	490	288	60	13	1	362	-128	-26
All Terrain	55	0	8	63	56	0	0	0	56	-7	-11
Total	***403***	***105***	***87***	***595***	***373***	***72***	***19***	***3***	***467***	***-128***	***-21***

Appendix 2

UK Ministry of Defence—Guide to the Common Technical Requirements for Military Logistic Vehicles and Towed Equipment

The UK Ministry of Defence has developed a 'Guide to the Common Technical Requirements for Military Logistic Vehicles and Towed Equipment (March 1994)' containing standard mobility criteria. This publication includes tables with mobility criteria guidance values against the vehicle classifications of: utilities and light trucks; medium trucks; and heavy trucks; and for each mobility class, namely: low mobility; improved low mobility; medium mobility; improved medium mobility; and high mobility.

The five mobility classes are defined as:

Low mobility. Low mobility characteristics are acceptable for vehicles which only rarely have to move off roads and where their use may be restricted to less exacting conditions of climate and terrain than those for which most military vehicles are designed. Low mobility is presently characteristic of large cargo vehicles designed for commercial use. How far forward in the battle area such vehicles may be used will depend on the logistic environment in which they are to operate, the tactical phase of battle and the enemy air threat. The need to avoid double-handling of stores must be weighed against the possible failure of low mobility vehicles to negotiate obstacles, ferry sites and damaged roads satisfactorily.

Improved low mobility. Improved low mobility characteristics are those vehicle abilities which are greater than those of the low mobility vehicle but fall short of the medium mobility vehicle.

Medium mobility. Medium mobility implies an ability to negotiate damaged roads and tracks, to leave them to seek cover, to reach hides and to negotiate river crossings and ferry sites with military engineer assistance. Vehicles with medium mobility characteristics are required for widespread deployment throughout the Corps area, out of the direct fire zone but sufficiently concerned with the support of units actively engaged with the enemy to force them to change some routes away from roads and tracks on occasions. They therefore require a genuine cross country performance not easily achieved without all-wheel drive, but an in-built obstacle crossing capability is not demanded.

Improved medium mobility. Improved medium mobility characteristics are those vehicle abilities which are greater than those of the medium mobility vehicle but fall short of the high mobility vehicle.

High mobility. High mobility characteristics are required for vehicles integral with the forward battle groups so that they can cater for the immediate needs of battle groups and for their supporting artillery and engineers in a fast moving tactical battle. High mobility implies the ability to reach positions occupied by armoured fighting vehicles. The route to such positions may be dictated by tactical considerations and logistic vehicles must be able to operate well away from roads and tracks and be able to cross difficult terrain by day and night. High mobility includes some built-in capability to cross minor wet and dry obstacles without military engineer assistance.

The mobility criteria used, include:

Clearance. To permit operation of the logistic vehicle off the road and to negotiate bridges and ramps without damage to vulnerable components, the following clearances shall be defined in the Statement of Requirement or Technical Specification:

a) angle of approach (laden) minimum angle;

b) angle of departure (laden) minimum angle;

c) under vehicle clearance (laden) maximum angle; and

d) ground clearance (laden) minimum angle height.

Gradeability. Gradeability shall be as stated in the vehicle Statement of Requirement and/or Technical Specification.

Articulation. The fully laden logistic vehicle shall be subjected to test facilities to negotiate the nominated articulation gauge without fouling any part of the vehicle or causing fouls between running gear and body, cab or adjustment parts for:

a) the specified clearance height; and

b) the specified under vehicle clearance angle.

Speed and acceleration. The sustained speed and acceleration shall be as specified in the vehicle Statement of Requirement and/or Technical Specification.

Fording. The logistic vehicle shall be capable of shallow fording to the appropriate figure as defined for each vehicle, without the need for applique waterproofing.

Turning circles. For all logistic vehicles and variants the turning circles shall be stated.

Stability. The vehicle stability requirements shall conform to stated requirements.

Appendix 3

Performance audits in the Department of Defence

Set out below are the titles of the ANAO's performance audit reports in the Department of Defence tabled in the Parliament in recent years.

Audit Report No. 5 1993–94
Explosive Ordnance

Audit Report No. 11 1993–94
ANZAC Ship Project—Monitoring and Contracting

Audit Report No. 19 1993–94
Defence Computer Environment Supply Systems Redevelopment Project

Audit Report No. 27 1993–94
US Foreign Military Sales Program Explosives Factory Maribyrnong

Audit Report No. 2 1994–95
Management of Army Training Areas Acquisition of F–111 Aircraft

Audit Report No. 13 1994–95
ADF Housing Assistance

Audit Report No. 25 1994–95
ADF Living–in Accommodation

Audit Report No. 29 1994–95
Energy Management in Defence ANZAC Ship Project Contract Amendments Overseas Visits by Defence Officers

Audit Report No. 31 1994–95
Defence Contracting

Audit Report No. 8 1995–96
Explosive Ordnance (follow–up audit)

Audit Report No. 11 1995–96
Management Audit

Audit Report No. 17 1995–96
Management of ADF Preparedness

Audit Report No. 26 1995–96
Defence Export Facilitation and Control

Audit Report No. 28 1995–96
Jindalee Operational Radar Network (JORN) Project

Audit Report No. 31 1995–96
Environmental Management of Commonwealth Land

Audit Report No. 15 1996–97
Food Provisioning in the ADF

Audit Report No. 17 1996–97
Workforce Planning in the ADF

Audit Report No. 27 1996–97
Army Presence in the North

Audit Report No. 34 1996–97
ADF Health Services

Audit Report No. 5 1997–98
Performance Management of Defence Inventory Defence Quality Assurance Organisation

Audit Report No. 34 1997–98
New Submarine Project

Audit Report No. 43 1997–98
Life–cycle Costing in the Department of Defence

Audit Report No. 2 1998–99
Commercial Support Program

Audit Report No. 17 1998–99
Acquisition of Aerospace Simulators

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Series Titles

Titles published during the financial year 1998–99

Audit Report No.1 Performance Audit
Corporate Governance Framework
Australian Electoral Commission

Audit Report No.2 Performance Audit
Commercial Support Program
Department of Defence

Audit Report No.3 Performance Audit – Follow-up
Assessable Government Industry Assistance
Australian Taxation Office

Audit Report No.4 Performance Audit
Client Service Initiatives
Australian Trade Commission

Audit Report No.5 Performance Audit
Commonwealth Agencies' Security Preparations for the Sydney 2000 Olympics

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