

Ministry of Defence
Progress in Reducing Stocks

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
HC 898 Session 2001-2002: 20 June 2002



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executive summary

- 1 In 1998 the Ministry of Defence (the Department) estimated that it held stocks valued at £19 billion - £11 billion non-munitions and £8 billion munitions¹. The Strategic Defence Review concluded that there was scope for significant reductions in stocks in the post Cold War environment and that savings in logistics should be used to fund the required enhancements to military capability to support joint expeditionary forces. The Review set a 20 per cent (£2.2 billion) stock reduction target for non-munitions stocks. This target was incorporated in one of the Department's Public Service Agreements, and was to be achieved by April 2001. The Department has reported to Parliament that it has achieved the target by a considerable margin. Significant reductions have been made but because of weaknesses in the measurement regime we are not fully able to validate performance.
- 2 This report examines the Department's performance in reducing its stocks and whether there is scope for further stock reductions. It follows our 1998 Report: A Case Study of Stores Management in the Ministry of Defence. The methodology we adopted is set out in Appendix 1.
- 3 The Department has made significant progress in reducing stocks but there is considerable scope for further reductions. Our recommendations should contribute to the Department's efforts to reduce surplus stocks.

The Department has made significant progress in reducing stocks (Part 1)

- 4 The Department has undertaken specific actions which have resulted in significant stock reductions. The three-year target period 1998 to 2001 covered the establishment of the Defence Logistics Organisation. In the first two years the Department instigated action, including a review of the top 1,000 high value items held by each of the three Services (Sea, Land and Air). This has resulted in reductions of more than one quarter of these items, valued at £595 million. In addition stock managers reviewed their holdings, concentrating on obsolete stocks. Since the establishment of the Defence Logistics Organisation in April 2000, the Service environments have set targets for stock disposals monitored monthly. Results were impressive with Air achieving more than £1 billion reductions in the six months to March 2001.
- 5 The Department has reported stock reductions of £2.8 billion, exceeding its target by £600 million. These figures need to be interpreted with caution. The Department faced a very considerable challenge in transforming the three single Service organisations into a modern and truly joint management system. At the time the reduction target was set, stock information was not totally reliable, the basis of the target was not clearly defined and there was no consistent understanding of what should be counted as a reduction. The target was set on a net book value basis, taking into account depreciation of stock

¹ The figures are taken from the Department's Strategic Defence Review Cm 3999 July 1998 paragraph 185 and are based on the Department's Balance Sheets at April 1998. They are net book values after depreciation and provisions (see Figure 4).

value due to age or usage, but performance has been monitored and reported in gross book value terms. At the outset many stock items were over-valued and reducing the price of stock has contributed to the Department's overall stock reductions. For example £400 million of Air's £755 million stock reduction by June 1999 was achieved by writing down stock values with no change in actual volumes of stock held. On the other hand a number of items had nil or notional prices and the Defence Logistics Organisation has undertaken a great deal of work to establish appropriate prices which has resulted in price increases of some £100 million. We have commended the efforts to validate prices in our financial audits.

- 6 The Department decided at the time that although it could have done more work to establish baselines and agree a uniform approach, this would have taken time and would have inevitably delayed progress in achieving stock reductions. The Department has recognised the problems arising from the stock reduction exercise in its lessons learned report for future target setting. It has made great efforts to improve stock systems and data and our annual financial audits have identified significant improvements, although as our audit of the 2000-01 consolidated accounts reported, further progress is still required and new systems will not be fully operating for a number of years. The difficulties in measuring achievements mean that the Department cannot identify the precise extent to which stock reductions have resulted from disposing of surplus stock or from revaluing stock. There have been significant disposals of stocks and taken together with the initiatives to improve financial and management data, this amounts to very significant progress.

There is significant scope for further reductions (Part 2)

- 7 The Department has established a clear strategic direction for better inventory management and is developing its sustainability policy in line with the need for rapid, mobile expeditionary forces. In some areas this policy could lead to a requirement for new stocks to be built up but in other areas there would be scope for significant stock reductions.
- 8 The Defence Logistics Organisation has set a strategic objective to reduce the cost of its outputs by 20 per cent by 2005. Stock reductions contribute to reducing costs and the Defence Logistics Organisation has set an overall 5 per cent target for stock reductions in 2001-02 and 2002-03, with the intention of setting similar targets for following years. As a result of the implementation of Resource Accounting and Budgeting across the Department, the Defence Logistics Organisation is introducing charges for assets and stocks to provide real incentives to teams to reduce their stock holdings. At the same time it is driving forward the work to transform the supply chain with a series of business improvement initiatives.
- 9 Large volumes of slow moving stock indicate significant scope for further reductions beyond those targets. The Department's own analysis of Air stocks, the largest Service environment, shows stocks valued at £1 billion classified as 'inactive' and a further £1 billion having a stock turn of more than 60 years. Our analysis of the Department's stock holdings showed that stocks valued at £12 billion (65 per cent of the total stock) are slow moving, where the Department holds more than 10 years of stock. We estimate that the annual cost to the Department of holding such stock is £870 million. For some items there will be good reasons why the Department has such slow moving stock particularly in peace time - it may be that when procuring new equipments all the associated spares were included. However, these arguments are less relevant to the Department's £2.7 billion slow moving consumable items





where many are readily available from industry. Part of the explanation for the slow moving consumable items stems from the legacy systems and processes which were operating prior to the establishment of the Defence Logistics Organisation and which will take some time to converge. The Department has recognised the need to change fundamentally the purchase of consumable items, for example through the establishment of the Non-Project Procurement Office.

- 10 From our detailed examination of high value items, worth about a tenth of the total inventory, we identified a number of cases of potential over-stocking. For example, Land holds 4,000 radiation detection units worth £10 million. Whilst these units could be used they are a throwback to the Cold War and lack the sensitivity needed for the modern battlefield. Air holds 440 years worth (at peace time rates of consumption) of fuel tanks worth £41 million. During military operations the tanks would be used at a faster rate but the Department has not yet completed its analysis to determine future requirements. In order to meet sustainability and readiness targets there is a requirement to hold stocks during peacetime but there is a need for stocks to be regularly monitored and for operational users to keep their requirements under review. We also identified errors in the inventory with 1,175 brass nuts being valued at £83 million when they should have been valued at £1.17. The Department has undertaken extensive validation exercises on stock prices but errors do still arise and are corrected when identified.
- 11 Slow moving stock could indicate that holdings exceed those required. This could reflect a change in requirements since items were originally purchased, particularly for items bought in bulk to last the full expected life of the equipment to which they relate, for example a fleet of aircraft. In recent years the Department has operated in a very different international environment and equipment numbers have fallen, with consequential reductions in the requirement for spare parts. Also forecast stock turns may not present a complete picture of the likely usage of items since they reflect historic demand and may not allow for changes in usage patterns.
- 12 In addition there are other strategic justifications for holding stock, irrespective of normal peacetime usage. These include the need to hold war reserves of complex stock which cannot be procured during likely warning times, and commercial decisions on the need to buffer against production lines being closed for key inventory items. Much work is underway to segment the inventory and adopt a more intelligent understanding of its dynamics. For example the Support Chain Integrated Business Team is developing critical success factors for inventory management.
- 13 The explanations for continued holdings of surplus stocks are various and stock reduction has not necessarily been a high priority in the past. While there has been a strong strategic push to reduce stocks since its establishment, the Defence Logistics Organisation faces many competing demands and is striving hard to meet the requirements of the front line deployed in many operations. And the pressure to minimise stocks is not as great as in the commercial world, although the introduction of Resource Accounting and Budgeting is having real impacts by highlighting the cost of holding stock and getting management attention. There remains a need on the part of stock managers to balance the drive for economy with meeting demands from customers and dealing with operational contingencies.
- 14 There is nevertheless much good practice in the Department that has wider application in the drive to reduce stocks. The Defence Logistics Organisation is undertaking important work on sustainability that is needed to gain a full appreciation of the demand for stocks, although analysis here is compromised

by the poor data on the reliability and usage of equipments. Good work is being achieved through headquarters initiatives such as the Support Chain Integrated Business Team and Heads of Specialisation who together provide a focus for expertise in inventory management, amongst other logistics disciplines. Project teams responsible for stock are reviewing stock holdings and using innovative techniques to identify further reductions. For example new partnering arrangements with industry have significantly reduced repair times for marine diesel engines leading to £5 million stock reductions. Other teams are driving down repair and maintenance costs and so reducing the demand for spares.

- 15 More innovative contracting is also leading to stock reductions. The Non-Project Procurement Office was set up to manage general stores. Better contracting has led to significant savings. In its first year of operations it reduced the number of its suppliers from 150 to just six, making savings of some £40 million on new contracts valued at £350 million. Other partnering agreements are resulting in the Department reducing its stocks and transferring stock holding activities and risks to contractors.



Recommendations

16 The Department recognises that whilst surplus stocks remain on the books, they represent a drain on resources which could otherwise be used to help make good current capability gaps or fund future procurements. Much effort is being expended on tackling these issues. We have identified examples of good practice as well as our own suggestions for areas of future work that should help the Department dispose of significant volumes of stocks.

- The Department should revisit its stock reduction targets and ensure that these take full account of the large volume of slow moving stock, particularly the high volumes of consumable items.
- In setting targets the Department should clearly define the target, establish robust baselines and ensure consistency in measuring achievements.
- As the Department's new stock systems will not be fully operating for a number of years project teams need to improve their management information so as to drive down surplus stocks. The Department also needs to improve its data on repair activity and failure rates so as to accelerate its work on sustainability.
- The Department should disseminate the good practices of some areas where teams have a full grip on the inventory - how much stock, where it is, its condition, value and costs of holding stock - as summarised in **Figure 1**. The good work of the Non-Project Procurement Office, together with the results of successful stock reduction projects, should continue to be widely disseminated in an effort to encourage cultural change, balancing the drive for economy in managing the inventory with meeting customer demands.

1 Summary of good practice initiatives included in report

Good Practice	Impact on Stocks
1. Setting targets (Part 1 and 2.4)	Setting targets for reducing stock and operating a robust performance monitoring regime should focus attention on driving down surplus stocks
2. Better inventory analysis	
<ul style="list-style-type: none"> ■ Reviewing high value and slow moving items (1.5 and 2.12-2.22) 	Systematic review of high value and slow moving items has led to identification of surplus stocks
<ul style="list-style-type: none"> ■ Front line user review of requirements (2.21) 	Timely review of requirements by front line users can lead to stock being declared surplus and disposal action initiated
<ul style="list-style-type: none"> ■ Detailed inventory analysis (2.29) 	Detailed analysis of stockholdings helps identify surplus stocks as demonstrated by the Helicopter Engines Integrated Project Team
3. Improving logistics systems	
<ul style="list-style-type: none"> ■ System convergence (2.10) 	Reduces inefficiencies, including duplication of stockholding that exists at present with many independent systems
<ul style="list-style-type: none"> ■ Asset tracking (2.10) 	Contributes to better use of existing assets
<ul style="list-style-type: none"> ■ Stock optimisation tools (2.28) 	Helps identify surplus stocks
<ul style="list-style-type: none"> ■ Reliability centred techniques (2.35 and 2.36) 	A more efficient maintenance process for equipments means lower stocks of spares required to achieve target performance
4. Innovative contracting	
<ul style="list-style-type: none"> ■ Contractor Logistics Support (2.16) 	Transfer of stock management risk to industry
<ul style="list-style-type: none"> ■ Non-Project Procurement Office (2.31) 	Faster stock turn should mean lower levels of stockholding are needed
<ul style="list-style-type: none"> ■ Direct Supply (2.32) 	In many cases industry premiums for direct supply are cheaper than the costs of holding stock
5. Logistics expertise (2.34)	
<ul style="list-style-type: none"> ■ Support Chain Integrated Business Team/Heads of Specialisation 	Source of expertise and guidance for Integrated Project Teams. Also sponsor of better practice ideas

Part 1

The Department has made significant progress in reducing stock

- 1.1 In 1998 the Ministry of Defence (the Department) estimated that it held stocks valued at £19 billion after depreciation and provisions - £11 billion non-munitions stocks and £8 billion munitions. The Strategic Defence Review concluded that there was scope for significant reductions in stocks in the post Cold War environment and that savings in logistics should be used to fund the required enhancements to military capability to support joint expeditionary forces. The stocks built up during the Cold War were no longer appropriate for the demands facing the Armed Forces. Future deployments were likely to be on a much smaller scale where flexibility and co-ordination between forces would be the key components of success. And partnering arrangements with industry provided an opportunity for the Department to transfer some stock holding risks to others rather than managing its own stocks.
- 1.2 The Strategic Defence Review set a 20 per cent (£2.2 billion) stock reduction target for non-munitions stocks and this was incorporated in one of the Department's Public Service Agreements. The target was

to be achieved by April 2001. The Department has reported to Parliament that it has achieved the target by a considerable margin. This Part therefore examines the Department's progress in reducing stocks.

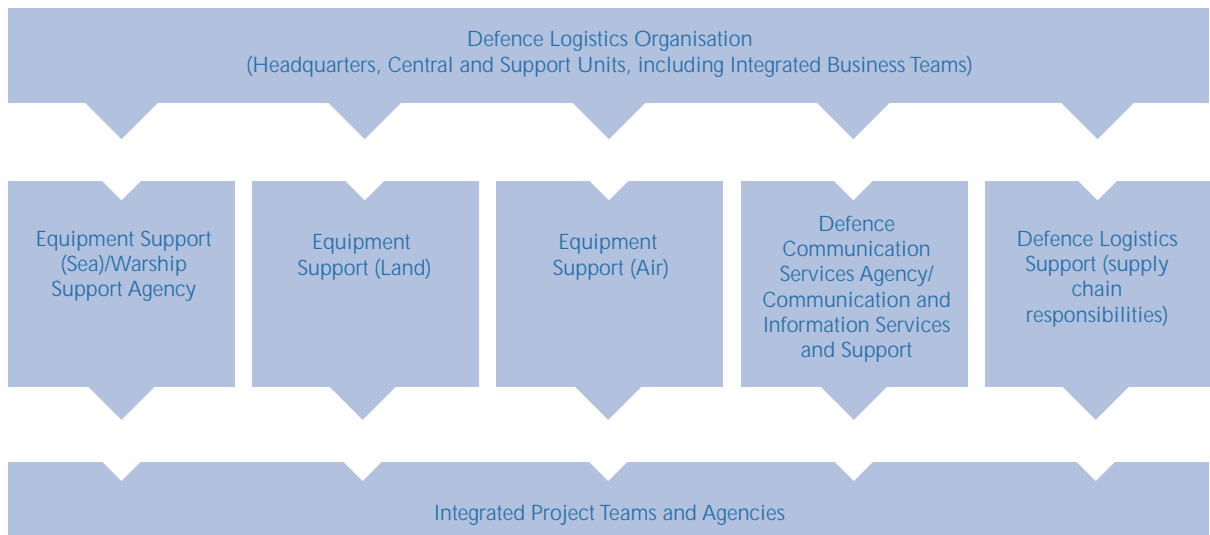
- 1.3 Part 1 shows that the Department has undertaken a number of actions to reduce stocks. These actions have contributed to the Department reporting a £2.8 billion reduction in stocks and so exceeding its target, but there are difficulties in measuring performance.

The Department has undertaken specific actions to reduce stocks

- 1.4 The target was set before the establishment of the Defence Logistics Organisation and in the early years the Department, through the single Service logistics organisations, began reviewing stocks. Since April 2000 the Defence Logistics Organisation has brought together the three Services' logistics support activities in one organisation (**Figure 2**).

2 The Defence Logistics Organisation

The Defence Logistics Organisation has brought together the three Service logistics organisations - Sea, Land and Air hold most of the inventory



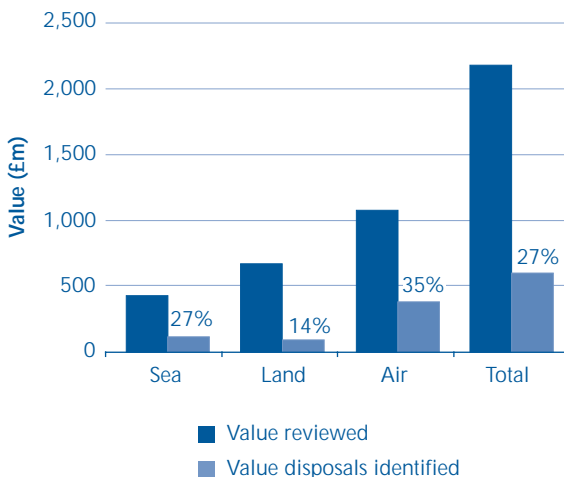
- 1.5 The Department's early action to reduce stocks included a review of the top 1,000 items in each of the Service organisations. These reviews covered more than £2 billion stock and resulted in disposals of £595 million stock (Figure 3). In addition to the review of high value items, managers within individual teams have made stock reductions, targeting ageing and obsolete equipments.
- 1.6 For the last year of the target period (April 2000 to March 2001), the Defence Logistics Organisation has set targets for stock reduction which has resulted in rapid progress. For example, the Air environment achieved reductions of £1 billion in gross book value in the six months to March 2001. Specific examples of large reductions include engine spares for Tornado aircraft, avionics kits, Nimrod Flight Control Units and Radar Installation spares. Land and Sea have also achieved significant reductions. Examples include: in Land, Clansman spares, FH70, Milan and Rapier components, Challenger tank and Land Rover support equipment; and in Sea, Exocet and 4.5" gun components, diesel engines, generator sets, radar and sonar spares.

The Department has reported a £2.8 billion stock reduction but there are difficulties in measuring performance

- 1.7 The Department reported that it had exceeded its £2.2 billion Public Service Agreement but because of weaknesses in the measurement regime we are not fully

3 Results of the Department's reviews of the top 1,000 items

Following review of the top 1,000 items, the Department has disposed of over one quarter of stocks



Source: Defence Logistics Organisation

able to validate performance. The Department has drawn lessons from its stock reduction exercise and sought to improve its financial data.

The Department has reported that it exceeded its Public Service Agreement target

- 1.8 The Department reported in its Performance Report 2000-01 that it had achieved stock reductions of £2.8 billion, exceeding its £2.2 billion Public Service Agreement target by £604 million (27 per cent).
- 1.9 The Strategic Defence Review and the Public Service Agreement called for a 20 per cent reduction in 'book value'. At the time Ministers referred to a 'net book value'. Because of the weaknesses of its stock provision and depreciation data, the Department considered that it would be more sensible to monitor progress against gross book values (Figure 4). It estimated that a £4.5 billion reduction in gross book value would be equivalent to the original 20 per cent target. In March 2001 the Defence Logistics Organisation's monitoring report showed that the target was likely to be met, with forecast stock reductions £604 million above the new target (Figure 5). Following completion of its analysis, in August 2001 the Department advised Ministers that it had exceeded its stock reduction target by £581 million.

4 Relationship between Gross and Net Book Value

Gross Book Value	A
Subtract: Depreciation	(B)
Stock provision (cost of stock becoming obsolete)	(C)
Net Book Value	D

Book value shows the value of assets (stocks) in the balance sheet. Gross book value may show the price paid for the assets or it may be indexed for inflation. Net book value takes account of depreciation and provisions.

Repairable stocks depreciate in value as they wear out over a number of years. Consumables may also lose value and the reduction in value needs to be 'provided for' in the Accounts. Examples of repairables and consumables are:

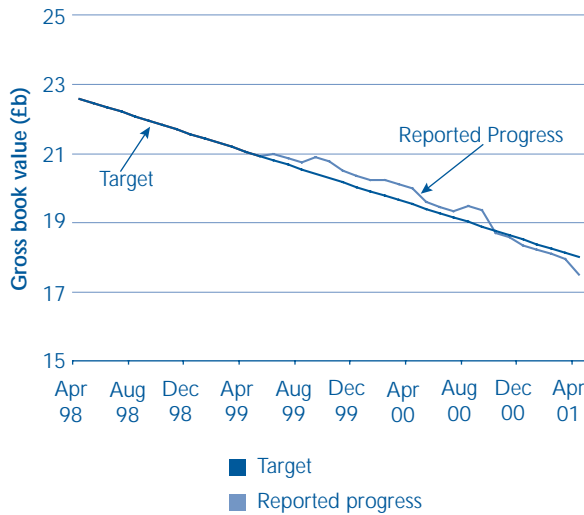
A **repairable** stock item is bought for £1,000 and expected to last for 10 years. There is a depreciation charge of £100 a year. The gross book value is £1,000 and each year its net book value will reduce by £100.

Consumable stock worth £1,000 is purchased in 2000 giving a gross book value of £1,000. However, the stock deteriorates when in storage and the Department estimates that the stock is worth £100. It therefore has to create a stock provision of £900 and the net book value is then £100.

Source: National Audit Office

5 Progress on stock reduction at March 2001

By March 2001 the Defence Logistics Organisation forecast that it would exceed its target by £600 million



Source: Defence Logistics Organisation

1.10 The Defence Logistics Organisation included two other analyses in reporting its performance (Figure 6):

- Given the original ministerial comments, the Department estimated equivalent net book figures. It re-examined the original £2.2 billion target in the light of more accurate balance sheet figures and concluded that the target should be increased to £2.4 billion. The analysis showed that stocks had been reduced by £3.5 billion.

- Secondly the Department compared its opening stock at April 1998 with its closing stock at March 2001. This comparison takes account of new equipments brought into service during the target period, rather than ring fencing the stock items at April 1998. The Department reported that it had achieved overall stock reductions.

It is not possible to validate reported performance

1.11 The Department has clearly made significant progress in reducing stocks but uncertainties surrounding the baseline, the definition of the target basis and reporting of achievement mean that we are unable to confirm the accuracy of all the detailed figures and hence we are not able to validate the reported performance.

Baseline figures are not reliable

1.12 The baseline figure of £11 billion for non-munitions stock was not established robustly. The figure was taken from the Department's April 1998 balance sheet.

1.13 Our financial audits have found significant weaknesses in the Department's stock figures. Our work on the Department's April 1998 balance sheet showed that stock figures could have been either over or understated by over 20 per cent. Hence the £11 billion stock figure may be over or understated by as much as £2.2 billion - the target figure itself.

1.14 The problems we found related to the numbers of each line item held by the Department and the prices of stock items.

6 Value of reported stock reductions

The Department reported significant stock reductions and that it had exceeded its target

	Opening Book Value £m	Closing Book Value £m	Target £m	Outturn against Target £m	Excess over Target £m	Overall Reduction %
Gross Book Value						
■ Target stocks	22,625	17,516	4,528	5,109	581	22.6
■ All stocks (including new equipments)	22,625	19,862	n/a	2,763	n/a	12.2
Net Book Value Equivalent						
■ Target stocks	11,992	8,510	2,395	3,485	1,090	29.1
■ All stocks (including new equipments)	11,992	10,889	n/a	1,103	n/a	9.2

Source: Defence Logistics Organisation

- Two examples illustrate problems with volumes. There were concerns as to whether all items owned by the Department but held by contractors during the repair process had been included in the Accounts. The Department has actively pursued this matter and generated a Defence Standard that should help avoid further problems. Secondly, there were many cases where financial records were not updated when stocks were consumed. Hence items were still included in the Department's Balance Sheet figures when they had in fact been issued from depots and were being used at the front line.
- Accurate prices were not available for many stock items. Where there were price data, these had frequently been recorded many years before and had not been updated. For some 75 per cent of all items there was no documentation to support the prices recorded on the inventory and notional prices were common - for example items priced at £0.01 or £1.00. The Department has undertaken a great deal of work during the last three years to ensure that prices are valid.

The basis of the target was not clearly defined

1.15 The basis for measuring achievement was not well defined. This was in part a result of having to use legacy systems and processes and the Department recognised that it would take some time to converge systems in the new Defence Logistics Organisation. Consequently the Service environments developed different approaches to score stock reductions. For example there were differences regarding new equipments and what constitutes disposals:

- The Sea and Air environments ring-fenced equipment at April 1998, and measured changes in stock values for those items. In contrast Land included new stock items supporting equipments introduced into service during the target period in its stock figures for April 2001.
- There are differences in the treatment of items identified for disposal. The Sea environment excluded items awaiting disposal estimated at £300 million from its baseline valuation even though it still owned them. Land and Air counted items as part of their balances until disposals were completed. Hence disposal action might already have been underway for these items.

1.16 There was uncertainty as regards valuation policy - that is the basis upon which items are priced and what to do when prices were incorrect.

- The Department identified that many April 1998 stock prices were over-stated and should be reduced, with Resource Accounting and Budgeting acting as a catalyst. Where the Department reduced prices of stocks, this was scored in the monitoring of stock reductions. For example, £402 million of the Air environment's £755 million reduction by June 1999 was a write-down in stock prices with no change in volumes.
- On the other hand a number of items had nil or notional prices and the Defence Logistics Organisation has undertaken a great deal of work to establish appropriate prices, which has resulted in price increases of some £100 million. We have commended the efforts to validate prices in our financial audits.
- The Land environment used professional valuations for some items but often returned to contractors for prices. Air used average prices of similar items where prices were not easily obtainable and Sea used a variety of methods.
- For revaluation, the Department's policy has been to apply inflation factors to gross book values at the year end. This policy has changed and from 2000-01 accounting rules require that all assets must be revalued by professional valuation on a regular basis.

The measurement of achievement was not accurate

1.17 Given the uncertainties surrounding the April 1998 stock holding, there are difficulties in tracing changes in the stock values of individual line items over the three-year target period. The Defence Logistics Organisation has since made sterling efforts to 'clean' its data. It considered using the cleansed data to refine the original starting point but this would have diverted resources away from the stock reduction work. The Department's Internal Audit supported this view.

The Department has drawn lessons from its stock reduction exercise and sought to improve its financial data

1.18 The Department has recognised the problems arising from its stock reduction exercise and has identified important lessons for future target setting. Internal Audit drew attention to the need for firm base lines when setting targets and for an agreed methodology for scoring achievements.

1.19 The Department has made great efforts to improve stock systems and data. Our annual financial audits have recognised this progress but have continued to identify significant concerns with stock values. In examining the Department's dry run Resource Accounts for 1998-99 there were major areas of uncertainty and error which meant that we were unable to form an opinion. Again in 1999-2000 the combined effects of uncertainty and error meant that we were unable to form an opinion on whether the Accounts gave a true and fair view. We were able to report, however, that the Department had made very considerable efforts in tackling the challenges of resource accounting.

1.20 For the 2000-01 Resource Accounts we concluded that although major improvements have been achieved in the accuracy and reliability of stock management information, further progress is still required. We could not confirm the values for some stock and fixed assets and hence our audit opinion was qualified. The Defence Logistics Organisation has fully recognised these weaknesses and has action in hand to address them.



Part 2

There is significant scope for further stock reductions

2.1 The Defence Logistics Organisation has set a clear strategy for better logistics management and has set targets for further stock reductions. However, the large volumes of slow moving stock indicate significant scope for further stock reductions beyond those currently targeted. There is much good practice that has wider application in the drive to reduce stocks.

The Department has established a clear strategic direction for better inventory management

2.2 The Defence Logistics Organisation has developed a clear strategy for better inventory management, with stock reductions contributing to its target to reduce output costs by 20 per cent by 2005. It has embarked on an ambitious business change programme which should provide the enablers for transforming logistics.

The Defence Logistics Organisation has a target to reduce output costs by 20 per cent by March 2005, with stock reductions playing an important part

2.3 The Defence Logistics Organisation's mission is to provide joint logistics support to the Armed Forces. Its strategic goal is to reduce the cost of its outputs by 20 per cent by 2005 whilst ensuring that it continues to deliver and, where appropriate, improves the quality of its output. To meet this goal it has embarked on a series of business improvement initiatives, with full implementation of Resource Accounting and Budgeting underpinning these initiatives. Under a full resource accounting regime, over 40 per cent of the Defence Logistics Organisation's costs flow from its asset holdings. With an asset base in excess of £20 billion, comprising stocks, munitions and land and buildings,

reducing the volume and value of stocks and ensuring that assets are fully exploited is crucial to the success of the organisation. Hence there is continued effort to reduce stocks.

2.4 The Defence Logistics Organisation has set an overall 5 per cent target for stock reductions in 2001-02 and 2002-03. Individual areas have set more stretching targets - 10 per cent in 2001-02 across the Air environment and 20 per cent by March 2005 for the Warship Support Agency. Stock reduction targets have been cascaded to project teams and progress is monitored as part of the monthly balanced scorecard process. Specialist central teams are available to provide advice and expertise and project teams can use consultants.

2.5 The Defence Logistics Organisation is developing cost of ownership models which incorporate resource accounting. Under this arrangement project teams are charged for holding assets, including stocks. This should provide further financial incentive to reduce stock holdings. There is limited scope for incentivising project teams further as savings in logistics are required to help fund the Department's capability requirements in light of the Strategic Defence Review.

The Department is developing a sustainability policy for logistics

2.6 The Strategic Defence Review set the vision for the Defence Logistics Organisation's inventory strategy. The Department should hold ready only that manpower, equipment, materiel, weapons and ammunition that cannot otherwise be provided within readiness and preparation times without unacceptable operational risk or at greater cost. The Defence Logistics Organisation is now faced with translating this vision into business practice.

2.7 A clear understanding of the likely demand for stocks is a key determinant of stock levels. Sustainability planning, analysing the likely demand for stocks required for military operations and exercises, is being overhauled following the Strategic Defence Review and recent developments. The aim is to take into account the post Cold War changes in underlying assumptions and to harmonise sustainability requirements between the Services. A pilot project on munitions stockpiles has been completed. Scoping and clarification work has been progressed beyond the munitions area and the Defence Logistics Organisation is beginning implementation work. Implementation of new sustainability plans across the inventory should result in significant reductions of stockpiles. It will take time to achieve optimal stock levels. Stock holdings are a function of sustainability requirements, industry's ability to supply spares within specified time scales and the Integrated Project Teams' ability to innovate and incentivise industry.

The Defence Logistics Organisation is implementing an ambitious business change programme to provide the enablers for transforming logistics and promoting better inventory management

2.8 In its 2000 Corporate Plan, the Defence Logistics Organisation sets out to transform its business, people and processes. It has identified seven key areas for change, namely people, inventory, industry, capital asset management, engineering support, e-business and convergence. Many of these changes have direct implications for the current and future success in reducing stocks. The Defence Logistics Organisation has also developed business planning and performance monitoring through balanced scorecards, which are cascaded down through its business units. Other projects include the introduction of the European Foundation for Quality Management Excellence model, adopting a Whole Life Cost Approach and driving forward Smart Acquisition initiatives.

2.9 The business change programme aims to transform logistics and so drive efficiency, with stock reductions making an important contribution. The Defence Logistics Organisation has begun a transformation mapping exercise to benchmark its processes. The Department's initial analysis suggests that the Defence Logistics Organisation compares well in terms of customer services but there is considerable scope to make more efficiency savings.

2.10 Converging information systems across the three environments is a major challenge and much still remains to be done. A range of electronic solutions to current business needs forms part of this work.

- Asset tracking and inventory management should be improved by the introduction of new systems, although implementation of these will take time. Whilst new systems may be comprehensive, they may lack the sophistication of some systems which are already in place.
- An e-commerce framework should speed up interactions between the Defence Logistics Organisation, the Defence Procurement Agency, the Defence Bills Agency and industry.
- In addition, work is underway to ensure that all the data used to populate these new systems are as accurate as possible.

Large volumes of slow moving stock indicate scope for further stock reductions beyond those currently targeted

2.11 The Department has large volumes of slow moving stock and analysis of high value items shows scope for further action. Reducing such stock should lead to significant financial savings and contribute to depot rationalisation.

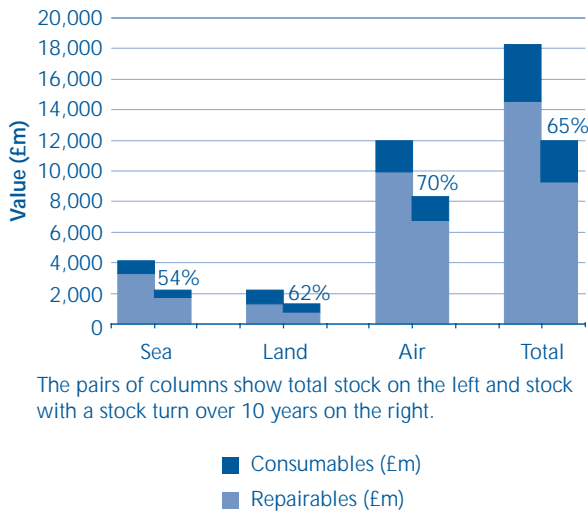
The Department has large volumes of slow moving stock

2.12 The Department holds some 1.5 million types of items valued at £18 billion. We examined stocks held by the three Service environments, analysing repairable and consumable stock, and forecast stock turn - a key indicator of the efficiency of inventory management. Stock turn measures the time it will take for current stocks to be issued to users. **Figure 7** shows that there is still a considerable amount of very slow moving stock in all three environments - two thirds of the inventory has a stock turn of more than 10 years.

2.13 Slow moving stock could indicate that holdings exceed those required. This could reflect a change in requirements since items were originally purchased, particularly for items bought in bulk to last the full expected life of the equipment to which they relate, for example a fleet of aircraft. In recent years the Department has operated in a very different international environment and equipment numbers have fallen, with a knock-on requirement for spare parts. Also forecast stock turns may not present a complete picture of the likely usage of items since they reflect historic demand and may not allow for changes in usage patterns.

7 Analysis of stocks between the Service environments

Almost two thirds (65 per cent) of the Department's inventory has a stock turn of more than 10 years



The pairs of columns show total stock on the left and stock with a stock turn over 10 years on the right.

NOTES

- 'Repairables' are those stocks that can be used more than once, and can be repaired when broken.
- 'Consumables' are those stocks that can only be used once.
- Stock Turn measures the time it will take for current stock to be issued to users and is calculated as current holdings divided by forecast annual demand.

Source: Defence Logistics Organisation

2.14 In addition there are other strategic justifications for holding stock, irrespective of normal peacetime usage. These include the need to hold war reserves of complex stock which cannot be procured during likely warning times, and commercial decisions on the need to buffer against production lines being closed for key inventory items. Much work is underway to segment the inventory and adopt a more intelligent understanding of its dynamics. For example the Support Chain Integrated Business Team is working on asset management critical success factors.

2.15 Nevertheless the high value of slow moving stock suggests that there is a need for the Department to review its holdings and that there is considerable scope to ratchet up stock reduction targets. With £12 billion slow moving stock there would appear to be scope for significant rationalisation, particularly as £2.7 billion of the slow moving items are consumables where many of these items should be readily available from industry.

Part of the explanation for the slow moving consumable items stems from the legacy systems and processes which were operating prior to the establishment of the Defence Logistics Organisation and which will take some time to converge. The Department has recognised the need to change fundamentally the purchase of consumable items, for example through the establishment of the Non-Project Procurement Office.

2.16 The cost of holding consumable stock compared to supply from industry has to be analysed on a case by case basis. Our earlier work on stores management concluded that the Department's costs of holding stock may well exceed premiums charged by industry for direct supply of stock². The Department recognises this and the Strategic Defence Review stated that the Department should not hold stocks when industry can be relied upon to deliver within the warning time judged to be available for conflict.

2.17 The Land environment holds some £2.2 billion stock, including obsolete and inactive stock. For example £159 million stock has no forecast demand. There are a number of explanations for stock having no forecast demand. New to service items may show no forecast demand and account for £59 million, with war reserves making up a further £7 million. But the Department considers that more than half the £159 million stock has no immediate prospect for use. In addition Land coded £58 million stock as obsolete. Our analysis shows that more than 60 per cent of all stocks have a stock turn greater than 10 years.

2.18 The Air environment holds some £12 billion stock. £5.4 billion has no forecast demand, including £1 billion stock classified as 'inactive'. Of the £6.5 billion stock where there is a forecast demand, Air holds £1 billion stock where the stock turn is over 60 years. Disposal of inactive stock and tackling the very slow moving stock would enable both the Air environment and the Defence Logistics Organisation to exceed their stock reduction targets for 2001-02. Our analysis shows that 70 per cent of stocks have a stock turn of more than 10 years.

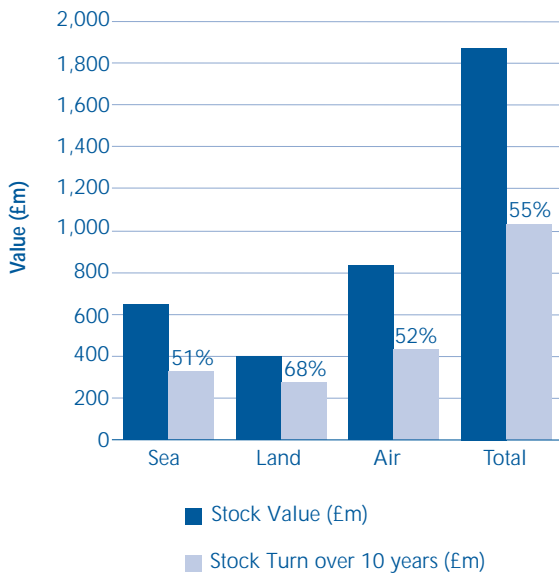
2.19 Our analysis of the Sea environment's inventory was complicated by the fact that Sea does not hold demand data for 8 per cent of its stocks. Sea holds over £4 billion stocks and we estimated that 54 per cent of stocks have a stock turn of more than 10 years.

Analysis of high value items shows scope for further management action

2.20 We examined the 30 highest value stock items in each Service environment and discussed the position with stock managers, including their plans for reducing stocks. These high value items comprise 10 per cent of the total inventory (**Figure 8**). The Department recognises that there is a need for better data on forecast demand and the costs of holding stock.

8 Analysis of top 30 stocks held by the Service environments

The Department holds more than 10 years of stocks for 55 per cent of the high value items



Source: Defence Logistics Organisation

2.21 Our detailed analysis of the high value items identified a number of examples of high levels of stock holding:

Land stocks

The Army has 4,000 Radiacmeters - a radiation detection item that was procured in the 1960s. These were declared obsolete in December 2001. The stock value is £10 million. The meters were withdrawn from units 10 years ago to avoid extended exposure to radiation sources but they could still be used to monitor high levels of radioactivity. In practice these are a throwback to the Cold War and lack the sensitivity needed for the modern battlefield.

The Army has rifles that are obsolete and surplus that still need to be kept in stock in an armoury at Donnington for security reasons. The Self Loading Rifle is no longer used and disposal action began in 1998 when it was declared obsolete. In October 2001 22,000 rifles were in stock and work is in hand to dispose of these rifles at a rate of 2,000 a month. 100,000 SA 80 rifles will become surplus during the next five years (**photograph A**). Some 20,000 SA 80 rifles are to be 'cannibalised', with 80,000 available for sale on a Government to Government basis. Through these processes the Defence Logistics Organisation expects to realise much of the £40 million value of the rifles.

Air stocks

The Department holds 1,775 long distance refuelling tanks with a stock value of £41 million (**photograph B**). The forecast demand for these items is four a year suggesting that the Department has 440 years of stocks, although consumption during military operations would increase. The Department has identified scope for reduction, but no action has yet been taken.

The Department has 170 obsolete Mk11 Hydraulic Trolleys with a stock value of £28 million. There is no demand for this item, but plans have not yet been drawn up for disposal action.

The Department has 59 Tornado anti-missile ('flare and chaff') containers with a stock value of £22 million (**photograph C**). No containers have been demanded by the front line for at least the last three years, and many of these containers cannot be used because they have reached their specified flying hours.

There are still problems with the accuracy of the inventory. An item with a value in the stock system of £83 million turned out to be 1,175 brass nuts with a catalogue value of 0.1p each. Therefore the stock value should have been £1.17. The Department has corrected its inventory.

Sea stocks

Sea has 53 BID-370 voice-encoding machines valued at £1 million. The items are obsolescent awaiting repair but the Department cancelled the repair contract and in September 2001 the equipment manager recommended the disposal of all items. No action has yet been taken.

There are further problems with inventory accuracy. An item with a value in the stock system of £192 million turned out to be 159 special personal computers with a catalogue value of £12,000 each. Therefore the total value should have been less than £2 million.



A: SA 80 Rifles



B: Tornado with refuelling tanks attached to wings



C: Tornado anti-missile container

2.22 The brass nuts and computer examples above illustrate problems with inventory accuracy. Prices may be incorrect for a number of reasons concerning input of data on to stock systems. For example stock items are identified typically by a seven-digit number and any mis-keying of this number would result in price data being incorrectly attached to the stock item. The Department has undertaken extensive validation exercises on stock prices but errors do still arise and are corrected when identified. For these reasons we were not able to confirm figures in the Department's 2000-01 Resource Accounts for certain stock and fixed asset balances and the associated charges to the Operating Cost Statement.

Reducing stocks should lead to significant financial savings and contribute to depot rationalisation

2.23 Our previous work on hazardous stores found that 83 per cent of the costs of holding stock related to interest on the cost of capital tied up in these stocks, and 17 per cent related to non-interest storage costs such as building, staff, overhead, packaging and transport costs. Applying this analysis to the Department as a whole today provides a broad estimate of the total costs of holding its stock, although this may tend to overstate costs. However, some of the examples of high value slow moving stock quoted in paragraph 2.20 include hazardous elements and require special storage.

2.24 It is costing the Department £870 million in respect of its £12 billion slow moving stock. A 10 per cent reduction in this slow moving stock through disposal could produce annual savings of around £87 million for other uses. Further savings would be generated by not re-provisioning stock that is being run down and avoiding re-ordering costs. This may underestimate the scope for savings as the Defence Logistics Organisation has estimated that 40 per cent of its annual running costs (£2 billion) are asset-driven.

2.25 Further progress in reducing stock would help in the effort to rationalise the number and cost of depots. The Defence Logistics Organisation reports monthly on storage reduction and is developing indicators for storage utilisation. Again our work on the hazardous stores inventory is relevant. It noted that there was scope to rationalise storage depots and described how one new depot was constructed to hold very slow moving items. It also covered the relative efficiency of a number of depots, examining utilisation rates and process costing such as staff costs for each transaction.

There is much good practice that has wider application in the drive to reduce stocks

2.26 There is much good practice that has wider application in the drive to reduce stocks. The Department has begun work to establish optimum stock levels and many individual units have responded well to the pressure to reduce stocks.

The Department has begun work to establish optimum stock levels

2.27 In taking forward its work on inventory management, the Defence Logistics Organisation is looking to establish optimal stock holdings across its inventory, balancing the ability to satisfy customer demands and meeting efficiency targets. This is a complex task, involving a detailed understanding of the whole supply chain operation. The goal is to change culture and introduce practical skills and knowledge to enable teams to optimise their own stocks. The Defence Logistics Organisation has introduced a strong framework to drive the achievement of this goal and ensure coherence between the many initiatives in train across the organisation. This includes the establishment of a Support Solutions Envelope and logistics policy and process framework. In addition the Support Chain Integrated Business Team and Heads of Specialisation provide a focus for expertise in inventory management.

2.28 The Defence Logistics Organisation is developing a number of models to help generate more reliable forecasts of demand for stock and how much stock should be held. All three Service environments have work underway and the Land environment's work on repairable stocks illustrates progress:

- The Equipment Support Sustainability Analysis Model (ESSAM) has been developed to help determine the stock levels needed for key equipments at specified levels of sustainability. It uses usage, reliability and repair loop data to calculate stock levels needed to avoid 'stock outs'. Comparison with actual stock levels can therefore lead to the identification of surplus stock holdings. The Defence Logistics Organisation has not, however, kept records of stock reductions flowing from the application of ESSAM.
- The Special Analysis Based Repairable Equipment (SABRE) is a tool for modelling stock usage in the repair loop. Using historic data it analyses demand for stock and helps identify possible shortages or surpluses. Four Integrated Project Teams have implemented the model, resulting in stock reductions of £35 million.

- As regards consumable stock, in 2001 Land introduced a formal review - Consumable Inventory Review Process. An integral part of this review has been the roll out of an optimisation software tool - System for Consumable Inventory Optimisation (SCION). Stock reductions of some £480 million are forecast for 2002-03 as a result of the reviews.

Individual units have responded positively to pressure to reduce stocks

2.29 The pressure to reduce stocks is leading teams to analyse their own stock holdings to look for savings and reduce charges under Resource Accounting and Budgeting. Many teams have undertaken their own sensitivity analysis to help determine optimal stock levels. For example the Helicopter Engines Integrated Project Team, one of the Defence Logistics Organisation's 'beacon' teams, has undertaken a detailed inventory analysis and put in place tracking arrangements for all engines. It has 2,100 engines for some 800 engine placements and is now determining its optimum stock level. Industry comparators suggest that there is scope to reduce stock. For example Bristow Helicopters Ltd operate with a maximum 30 per cent spares for critical items and achieve very high levels of availability - over 95 per cent. For logistics operations in industry, the efficiency of the supply chain is a key priority given the capital tied up and managers' focus on the value of stock held and time based measures such as stock turn.

2.30 Teams have also made progress in contracting out logistics support, analysing the repair process and making use of reliability centred techniques.

Innovative contracting and outsourcing

2.31 The Defence Logistics Organisation is looking to transfer stock management risks to industry where this makes economic sense. The Non-Project Procurement Office has undertaken major work on general consumable stock, rationalising contracting and achieving significant savings. The aim is to transfer the stockholding risk to industry where possible and reduce stock turn to two months where the Non-Project Procurement Office retains stock. In its first year of operations it reduced its customer base from 150 to just six companies, making savings of some £40 million on new contracts valued at £350 million. The full programme of business worth in excess of £1 billion should provide annual savings of £120 million.

2.32 Elsewhere in the Defence Logistics Organisation, Contractor Logistics Support is being pursued. This is where some or all of the support and maintenance functions for equipments, including stock holdings, are contracted out to a commercial organisation, with the

transfer of the responsibility for delivering an agreed level of availability to that organisation. Two examples illustrate progress:

- The Avionics Integrated Project Team contracted Smiths Industries for the provision of proprietary 'Horizontal Situation Indicators' for aircraft. Performance in supplying Indicators has improved and there have been reductions in the Department's stockholding.
- On Rapier, the Department has contracted Matra BAe Dynamics in partnership with Unipart Defence Logistics to manage the repair process and 18,000 consumable items formerly managed in-house.

Repair Processes

2.33 When calculating optimal stock levels for repairable items, better data are required on reliability and a proper reliability monitoring system needs to be put in place. At present reliability is measured in terms of failure rates, such as Mean Time Between Failure, and the cause of failures within equipments is not properly analysed. There is a need for a generic methodology for carrying out reliability analysis based on the actual causes of equipment failures to assist managers in minimising the life cycle costs for legacy systems.

2.34 The Defence Logistics Organisation has analysed repair processes, concluding that the time taken to repair items is substantially greater than similar activities in industry. Hence too many high value items are being held in the repair process. Achieving better performance in repair processes would enable the Department to reduce its holdings of high value items.

- Our Report 'Major Repair and Overhaul of Land Equipment' reinforces this analysis. It showed that a one-day reduction in repair times could enable stocks to be reduced by £3 million.
- Repair of marine diesel engines provides an example of the scope for savings. A pilot project was recently carried out by the Support Chain Integrated Business Team, industry and the Marine Propulsions System Integrated Project Team reduced repair turn round times from 200 days to 50 days with a target of 40 days. This has already enabled spares to be reduced by £4.6 million, and stock reprovisioning costs to be reduced by a further £1 million.

Reliability Centred Techniques

2.35 The Warship Support Agency has introduced reliability centred techniques designed to determine the best and most cost effective way of maintaining large military equipments. The knock-on effect of successful application of the techniques for stockholdings is that there will be considerable scope for reduction, as stocks usage will be better targeted and spares consumption will be considerably reduced. Reliability Centred Maintenance is now the endorsed maintenance policy for future platforms, major equipment procurements and for selected in-service platforms. It is still early days, and trialling is still underway. Other teams are also trialling the reliability centred techniques with some success, for example the Field Artillery's AS90.

2.36 Lifetime logistics costs are analysed as part of the acquisition process. All new equipments are subject to integrated logistics support which includes a strong emphasis on reliability centred techniques in developing maintenance policies.

Other Defence departments

2.37 The Department is not alone in looking for efficiencies in logistics. Stock reduction has been a priority in other military forces around the world. The Australian Department of Defence included stock reduction as an objective in its major 'Defence Reform Program' (1997-2001) to improve efficiency. The Australian National Audit Office reported that Defence operating costs were reduced by A\$18 million as a direct result of stock reduction³.

2.38 The United States General Accounting Office has also highlighted good practice. For example, in 2000 it reported on the progress of the United States Defence Logistics Agency in implementing best commercial inventory practice⁴. The report defines a best commercial inventory practice as one that enables the agency to reduce inventory levels and hold down costs while improving the responsiveness of the supply systems to user needs. The report highlighted significant progress. The most successful new practice adopted has been the 'Prime Vendor Initiative'. This is where stock management functions are transferred to industry, enabling the Agency to reduce its own stockholdings.

³ ANAO Report: "Defence Reform Program Management and Outcomes" - Report 16, tabled 05/10/2001.

⁴ GAO Report: "Defence Inventory: Opportunities Exist to Expand the Use of Defence Logistics Agency Best Practices" - Report NSIAD-0 0-30, published January 2000.

Appendix 1

Methodology

- 1 This appendix sets out the methodology for the study, covering our analysis of the Department's performance in reducing stocks and the potential for further stock reductions.

The Department's logistics strategy and objectives

- 2 In visits to the Defence Logistics Organisation central teams and business units, we discussed inventory management strategy and objectives. We reviewed corporate and business plans for the Defence Logistics Organisation and the main business units, the performance regime (hard and stretch targets and performance achievements) and discussed the quality of information available for managing logistics. We examined the challenges facing project teams in implementing stock reduction activities whilst delivering day to day logistics services to customers. We also liaised closely with our financial audit colleagues.

Analysis of stockholdings

- 3 We analysed the Defence Logistics Organisation's monitoring of performance against the stock reduction target and supporting information. We discussed our work with Internal Audit and examined relevant reports and papers prepared by them. We analysed current stockholdings in the three Service environments. Our initial work illustrated that many data sets were not held in comparable formats, especially individual item demand rates. We therefore translated all data into a consistent format to enable comparison between environments. From our data we extracted the top 30 highest value items in each environment. We discussed stock holdings and plans for their disposal with the relevant stock managers.

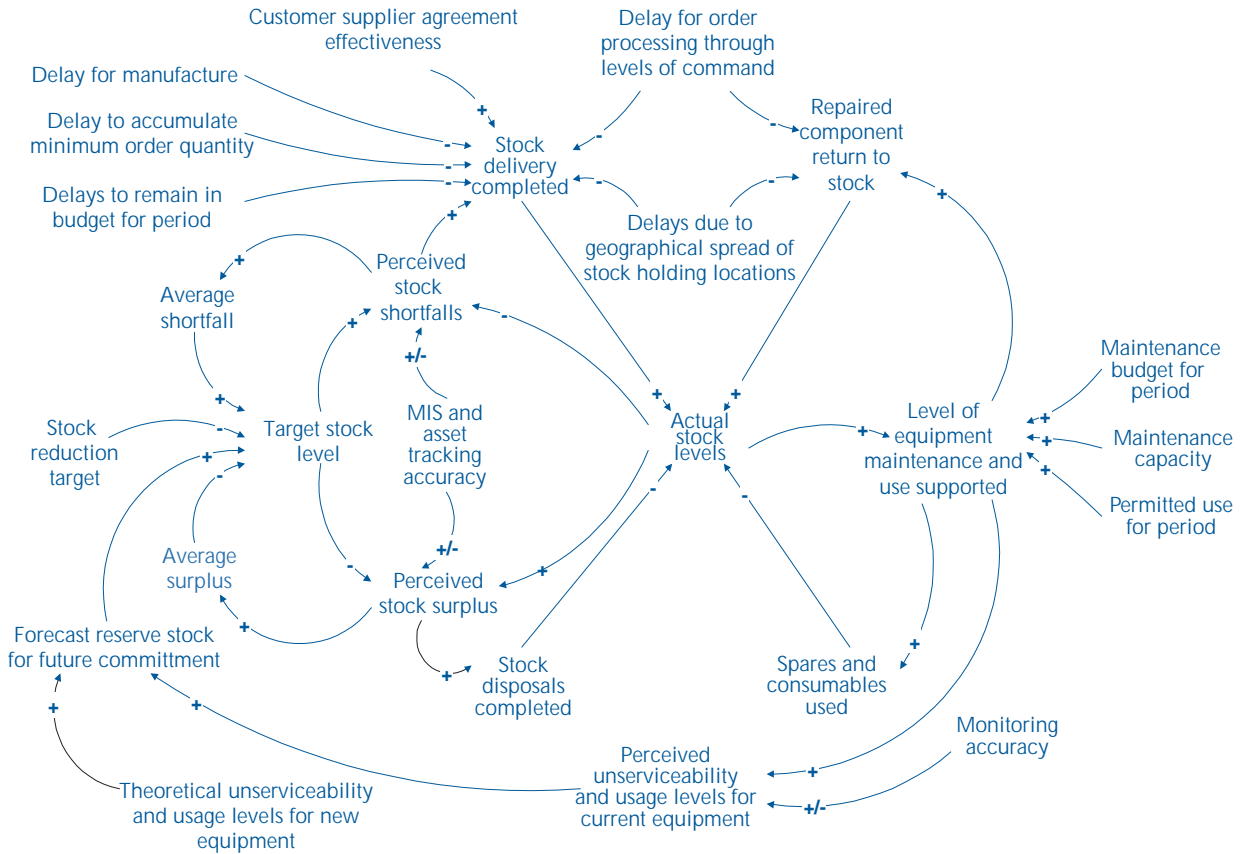
The Process Map

- 4 As part of our work, we developed an overview of the stock provisioning cycle in the form of a process map (Figure 9). This helped to structure our subsequent analyses, and provided assurance that no critical areas were omitted from our investigations. It also assisted us in illustrating the relationships between key stock activities. We employed HVR Consulting Services Ltd as consultants to develop the process map.

- 5 The process map broadly illustrates the dependencies between spares reprovisioning, demand forecasting, usage rates and the activities of the various suppliers of logistics. The map uses influence diagram notation to depict the cause and effect relationships between variables. Influence diagram notation consists of an arrow, to show the direction of the influence (the variable at the tail of the arrow exerts an influence upon the variable at the head), with + and - signs to depict the sense of the influence. Thus a positive (+) influence implies that if the tail variable increased in value, then the head variable would also be expected to increase. A negative (-) influence suggests that if the tail variable increased in value, then the head variable would be expected to reduce. Chains of cause and effect can then be established by tracing influences between several variables.
- 6 The focal point of the process map is 'Actual Stock Levels' towards the middle of the diagram. This represents the total quantity of stock available for use and results from the difference between supply and demand. Supply is the cumulative delivery of new stock plus any return of repaired components back into stock, as shown at the top of the diagram. Demand is the consumption of stock through use plus disposal of stock surpluses, shown in the bottom of the diagram.
- 7 Inventory control is exerted via the processes indicated to the left of the diagram. Stock control actions are taken in response to either shortfalls or surpluses. A comparison of stock levels with the 'Target Stock Level' determines which action is required. Management information and asset tracking systems are vitally important. The information upon which decisions are taken may be numerically inaccurate or untimely.
- 8 Two other factors will influence the setting of a stock target. These are the result of strategic objectives. One is the desire for stock reduction. The other is the need to ensure that an adequate reserve is maintained for possible future operational commitments. This latter will be over and above the stock level that is sufficient for normal peacetime and training activity and is, therefore, a forecast based upon the best information available.

9 Influence diagram for stock provisioning

The map shows the various influences on stock levels held and the importance of accurate management information (see paragraph 4 to 9 of this Appendix)



9 The influence diagram is completed by the equipment maintenance and operational or training use indicated on the right of the diagram. These activities drive consumption and may generate return of repaired or overhauled components. Maintenance and use activities are limited both by external factors and by the availability of the spares and consumables needed to operate the equipment. Performance monitoring of operational use takes place and is responsible for generating the data needed to forecast reserve stock requirements. Again, monitoring accuracy needs to be taken into account.

Consultants

10 We commissioned Dr Jęzdimir Knezevic of MIRCE Akademy (Management of Industrial Reliability, Cost and Effectiveness, Devon) and Keith Milk of HVR Consulting Services Ltd to advise on our approach and review our work.

Appendix 2

Glossary of Terms

This appendix explains the meaning of the technical terms used in the report:

Book Value	The value of assets (stocks) in the balance sheet
Consumable	An item of stock used once and not repaired
Depreciation	The cost due to wearing out of stocks through age or usage
Gross Book Value	The value of stocks based on the purchase price (which could be indexed for inflation)
Inactive	A stock item with no forecast demand but with the possibility of use in the future
Net Book Value	The value of stocks after subtracting depreciation and provisions
Obsolete	A stock item that is no longer of use
Obsolescent	A stock item that is becoming obsolete
Repairable	An item of stock that can be used more than once following its repair
Stock Provision	The cost to reflect the risk that stocks may become obsolete
Stock Turn	A measure of the time it will take for current stock to be issued to users. Calculated as current stock holdings divided by the number of stocks issued (or current stock divided by forecast demand for stocks to estimate forecast stock turn)
Sustainability	A measure of logistics performance in having enough stocks to support operations