

Business Enterprise Research and Development in Scotland 2002



Research & Development Expenditure and
Employment by Businesses in Scotland;
Comparisons with the UK



SCOTTISH EXECUTIVE

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Summary

1. The value of business enterprise research and development (BERD) undertaken in Scotland in 2002 was £640 million, 4.9% of the UK total. R&D expenditure in Scotland has nearly doubled (+95%) in real terms in the 5 years between 1997 and 2002, compared to a real terms increase of 22% in the UK.
2. R&D to develop pharmaceuticals has expanded particularly rapidly in Scotland: the 2002 value of £217 million is nine times higher in real terms than expenditure in 1997.
3. In 2002 R&D expenditure was equivalent to 0.77% of GDP in Scotland and 1.24% of GDP in the UK
4. Enterprises in Scotland spent £390 per employee annually on R&D, barely 60% of the UK figure of £669. However in manufacturing Scottish R&D expenditure per employee amounted to £2,100, much closer to the UK figure of £2,900.
5. Within the UK R&D spending per employee was lowest in the North East area, Yorkshire and the Humber, and Wales. Businesses spent highest on R&D in Eastern, South East, and South West. In Eastern England, spending per employee runs at four times the Scottish level.
6. Business research and development as a percentage of GDP is lower in Scotland than in important competitor countries, though ahead of Italy and at about the same level as Ireland. In 2002 overall EU expenditure was 50% higher than in Scotland, the OECD average was twice as high and in the leading country in the comparison, Sweden, businesses spent a four times higher share of GDP on R&D.
7. When total R&D in Scotland (undertaken by business, government and the higher education sector) is considered the value of R&D in Scotland reached £1,439 million, 7.5% of the UK. R&D represented 1.73% of GDP, nearly reaching the UK share of 1.83%. This is because government establishments and higher education institutions undertake a considerable amount of R&D in Scotland (14% and 13% of the UK total).
8. Four fifths of the R&D undertaken by businesses in Scotland was funded from UK business sources, a higher proportion than in the UK as a whole. Compared to the UK, a relatively small amount of work was outsourced. Despite this, the Scottish R&D services sector (SIC73) performed well and undertook one third of all Scottish business R&D. In the UK, the share of the R&D services sector was a quarter.

9. Nearly two thirds of Scottish BERD supported just three product groups: pharmaceuticals, radio, TV and communications equipment (including electronic components) and precision instruments.

10. Among the main products that attracted R&D in the UK, Scotland was relatively well represented in pharmaceuticals and radio, TV and communications equipment. Scotland was not well represented in R&D for aircraft and cars. Spending on R&D to support services (including computer related services) was also particularly low in Scotland. The small increase since last year may indicate that Scotland is now catching up.

11. Business R&D provided employment for 10,808 people in Scotland, that is 0.7% of the workforce (excluding public sector). Firms spent 25% less per R&D employee in Scotland than in the UK, and 22% less on salaries.

12. Scottish scientists and engineers, and scientific technicians and IT staff, tend to be better qualified than those in the UK as a whole. Together with other labour market data, this shows that in terms of skills and the availability of staff, Scotland is a place as good as or better than the UK as a whole for undertaking R&D.

13. Small firms undertake a larger share of R&D in Scotland (17%) than in the UK (12%). This is due to the fact that R&D for service products is dominated in Scotland by small firms. Medium sized firms are also relatively more important in Scotland than in the UK as a whole.

14. The top 15 enterprise groups (according to UK expenditure) performed very little R&D in Scotland. However these 15 major groups received over half of UK government funding.

15. Though firms which were under 10 years old made up 37% of the group performing R&D, they attracted only 11% of expenditure. In services around half of the firms were young and they produced around half of the R&D.

16. US based firms undertook 54% of Scottish R&D, followed by Scottish based firms (25%). Firms headquartered in the rest of the UK accounted for only 7% of Scottish business R&D expenditure.

17. Half of all Scottish business R&D was undertaken in the local authority areas of West Lothian and Edinburgh City.

1 Introduction

1.1 This is the third Scottish Executive analysis of Business Enterprise Research and Development (BERD) activity in Scotland. The aim of this report is:

- to present statistical information that illustrates the extent and type of expenditure on R&D performed in Scottish enterprises in 2002,
- to highlight Scotland's strengths and weaknesses and
- to inform the debate on the factors that might explain levels of BERD activity across Scotland.

1.1a This report has mainly been compiled from National Statistics¹ sources, including R&D expenditure data and employment, supplemented by non national statistics sources, for example on graduates and international comparisons. Appendix 1 lists the sources used and indicates their status within the National Statistics Framework.

1.2 In the context of economic development the interest in Research and Development activity stems from a desire to increase productivity and competitiveness through innovation. Basic research, often undertaken in universities or government research institutes is at the beginning of the innovation process. Universities are encouraged to commercialise their findings through licensing to enterprises - local, national and international - and by entering the marketplace directly through spin-outs and collaborative ventures. These may include business funding for broad areas of research or more direct contract research commissioned by businesses.

1.3 Research and experimental development undertaken by business enterprises directly is the second key ingredient in the innovation process. There is robust evidence to suggest that R&D expenditure has a positive impact on productivity within the company undertaking research and development activity². Furthermore, R&D activity has been shown to result in positive spill-overs for the rest of the economy³.

1.4 R&D can finally be used by enterprises for the creation of innovative manufactured or service products and for the renewal of processes. Their aim is to reduce costs and time to the market through process innovation and to gain a temporary monopolistic position in the market for their new products, leading to relatively higher product prices and profits, initially protected by patents and other mechanisms.

1.5 The innovation system has been described in more detail in Appendix 1 of the 2001 report, available at <http://www.scotland.gov.uk/library5/enterprise/berd01-08.asp>.

¹ http://www.statistics.gov.uk/about/national_statistics/default.asp

² The DTI publish a "R&D scoreboard" annually, which considers the correlation between R&D intensity and company size/profitability/market share etc.

http://www.innovation.gov.uk/projects/rd_scoreboard/introfr.html

³ Spill-overs arise through a number of mechanisms, for example, suppliers to a firm undertaking R&D may benefit from knowledge gained through their interaction with that firm.

Relevance

1.6 The earlier Scottish Executive reports on Business Enterprise R&D (Business Enterprise Research and Development in Scotland 2000 and 2001⁴) identified a significant shortfall in levels of Scottish expenditure on R&D, compared with the rest of the UK and other competitors. This is of concern to policy makers in Scotland given the link between R&D activity and productivity growth. The level of business investment in research and development as a proportion of GDP has been adopted by the Executive as a key target for improving Scotland's long-term economic performance. The "Framework for Economic Development in Scotland - 2004"⁵ identifies R&D and innovation as one of its five key priorities, seeing these as "the foundations for improvements in productivity and for sustainable global competitiveness".

Scope

1.7 This report focuses on the Scottish findings of the UK wide ONS BERD survey. The UK survey results for 2002 were published on 28th November 2003, followed by a more detailed tabulation for the UK as a whole known as Business Monitor MA14. This report is based on special analysis of the results of this survey undertaken by the Office for National Statistics on behalf of the Scottish Executive. The amount of Gross Expenditure on Research and Development (GERD) which includes government and higher education expenditure is available in "Research and Experimental Development Statistics 2002", published by ONS in the Economic Trends series.

1.8 Compared to last year the report has been extended to cover age, size and ownership of businesses in more detail.

Related Data

1.9 Other data on aspects of the Scottish innovation system (references in Appendix 1):

- Details on research expenditure in the higher education and government sector are published by the Department of Trade and Industry.
- The results of a survey of the commercialisation activities of universities is available from the Scottish Executive.
- The Community Innovation Survey, undertaken every few years throughout the European Union, deals with wider innovation. The most recent survey, undertaken in 2001 relates to innovation undertaken between 1998 and 2000. The next survey, to be undertaken during 2005, will deal with innovations introduced between 2001 and 2004.
- The Scottish Executive has commissioned a research study to determine the ways in which firms make decisions regarding the development of new products and processes and the importance of different factors influencing the extent, type and

⁴ <http://www.scotland.gov.uk/library5/enterprise/berd01-00.asp>

⁵ <http://www.scotland.gov.uk/library5/government/fedsm-00.asp?mode=view>

location of activity undertaken in support of R&D and innovation; the study is expected to be complete towards the end of the year.

Definitions

1.10 The ONS survey follows the definition of research and development proposed by the Organisation for Economic Co-operation and Development (OECD) and published in the 'Frascati' Manual. According to the manual, R&D is defined as

creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of the stock of knowledge to devise new applications

The definition therefore excludes activities such as market research, most software development, routine testing and quality control and artistic design work.

1.11 Business Enterprise Research and Development (BERD) refers to R&D undertaken within business enterprises, irrespective of the source of funding. Excluded is R&D undertaken in higher education institutions or government establishments (such as research council facilities or hospitals), even if funded by business enterprises. Public corporations are counted as business enterprises.

Sources

1.12 The survey sample is based on a list maintained by ONS of enterprises that are believed to undertake R&D activities, containing about 12,000 enterprises. This list has been compiled on the basis of the responses to the previous survey, filter questions in other ONS enquiries (in particular to the Annual Business Inquiry), and lists used by government departments for the administration of business support. All large R&D providers (those believed to undertake more than £3 million worth of R&D) were included in the sample (399 enterprises in the UK); another 3,600 companies which were identified as undertaking some R&D received an abbreviated questionnaire. The large companies accounted for about 85% of R&D expenditure. Altogether just over 3,800 UK businesses responded to the survey, a response rate of 96%.

1.13 In the questionnaire large R&D performers were asked to identify the sites at which they undertook research and development activity by postcode and to indicate the percentage of the company's activity that takes place there. The Scottish data contained in this report are based on survey respondents' allocation of overall UK expenditure to individual sites. Smaller R&D providers were assumed to undertake R&D at the site from which they reported it. Using this procedure identified 901 enterprises as undertaking R&D in Scotland.

Estimation

1.14 Results for non sampled and non responding enterprises have been imputed using ratios (per employed person).

1.15 The accuracy of the estimates is affected by sampling errors and non sampling errors. Sampling errors have been quantified for the UK but not for Scotland. Based on the UK calculation a 95% confidence interval for the overall Scottish figure of £640 million is probably in the region of +/-£20m, i.e. there is a 19 in 20 chance that the true value lies between £620m and £660m.

1.16 Non sampling errors are not systematic and are hard to quantify. This includes mis-interpretation of the definition of R&D, lack of coverage of the sampling list, and supplying incorrect information or unreliable estimates. Because of the difficulty of applying the Frascati definition these are important.

1.17 Results in this report are presented in terms of the best estimate available from the source. However small differences or year on year changes have to be treated with considerable caution. Some results cannot be made available to protect the confidentiality of respondents.

1.18 Most of the report deals with comparisons between Scotland and the UK for 2002. Longer term time series data have been adjusted for inflation using a GDP deflator supplied by ONS. The adjustment probably understates the growth of R&D volumes over time, because inflation for products benefiting from R&D, which are mainly manufactured products, is less than GDP inflation. Costs of inputs (wages and salaries and high tech equipment could be assumed to average out at the GDP inflation rate). The EUROSTAT “Handbook on price and volume measures in national accounts 2001 Edition” concludes that a satisfactory index of price changes for R&D does not exist.

1.19 As the price change between 2001 and 2002 is less than 3% comparisons between 2001 and 2002 have only been price adjusted when part of a long term time trend.

1.20 Regional GDP figures have been estimated by scaling regional GVA to the UK GDP figure.

Further sources

See Appendix 1 for further sources.

1.21 The report makes use of the number of employees by industry. These have been obtained from the Annual Business Inquiry (ABI) via NOMIS and refer to a fixed date in December 2002. Special analysis from the Labour Force Survey is used for occupation and qualifications. Graduates in disciplines relevant to R&D come from HESA.

1.22 International comparison use the publication “Main Science and Technology Indicators”, available from the OECD.

Revisions

1.23 ABI employment is revised annually to take account of further information received. The magnitude of these revisions for 2001 is relatively small: -8,200 for Scotland; +30,300 for GB. In manufacturing -9,100 in Scotland and -6,700 in the UK.

1.24 BERD data for 2001 have also now been revised following correction of company misreporting. This led to an upward revision of the 2001 Scottish figures by £0.8 million (0.15%) and a downward revision of the UK figure by £346 million (2.8%).

2 Headline Figures

2.1 In 2002 businesses enterprise research and development (BERD) expenditure in Scotland amounted to £640 million. Expenditure on R&D in Scotland has nearly doubled (+95%) in real terms in the 5 years between 1997 and 2002.

2.2 The value of BERD in the UK was £13.1 billion in the same year. This represents a 22% increase in real terms during the 5 years from 1997.

2.3 Despite the faster rise of BERD in Scotland, Scotland still accounts for only 4.9% of the total UK expenditure, an improvement from the 4.2% in the previous year and the 3.0% back in 1997 (see Table 1 and Chart A).

2.4 Compared to the Gross Domestic Product, expenditure on research and development in Scotland has risen to 0.77%, three fifths of the UK figure of 1.24% and half of the average of all OECD countries.

2.5 Scotland's relatively low share of UK BERD is reflected in R&D expenditure per employee: in 2002 this was £390 in Scotland compared to £669 in the UK. Scotland now reaches 58% of the UK level, a 10 percentage point increase since the previous year. The average spend per manufacturing employee in Scotland (£2093) is closer to the UK average of £2885, now reaching 73% of the UK figure. The increase compared to 2001 is due to both a decline in manufacturing employment and a rise in R&D spending on manufactured products.

Table 1: Value of Business Expenditure on Research and Development 1995 - 2002 (£million current prices)

	1995	1996	1997	1998	1999	2000	2001 ³	2002
	£m	£m	£m	£m	£m	£m	£m	£m
Scotland	269	302	291	358	393	400	512	640
UK	9,116	9,297	9,556	10,133	11,302	11,510	12,336	13,110
Scotland Expenditure as a percentage of UK	2.9%	3.2%	3.0%	3.5%	3.5%	3.5%	4.2%	4.9%
	£	£	£	£	£	£	£	£
Scotland Expenditure per employee (All Sectors ¹)	180	190	191	225	250	245	305	390
per Manufacturing Employee	683	639	676	794	1,020	1,202	1,620	2,093
per Employee (Other Sectors ¹)	45	56	63	81	62	30	36	64
UK Expenditure ^{1,2}								
per employee (All Sectors ¹)	542	509	516	536	588	590	626	669
per Manufacturing Employee	1,698	1,612	1,867	2,011	2,298	2,424	2,645	2,885
per Employee (Other Sectors ¹)	153	148	135	134	151	145	159	185

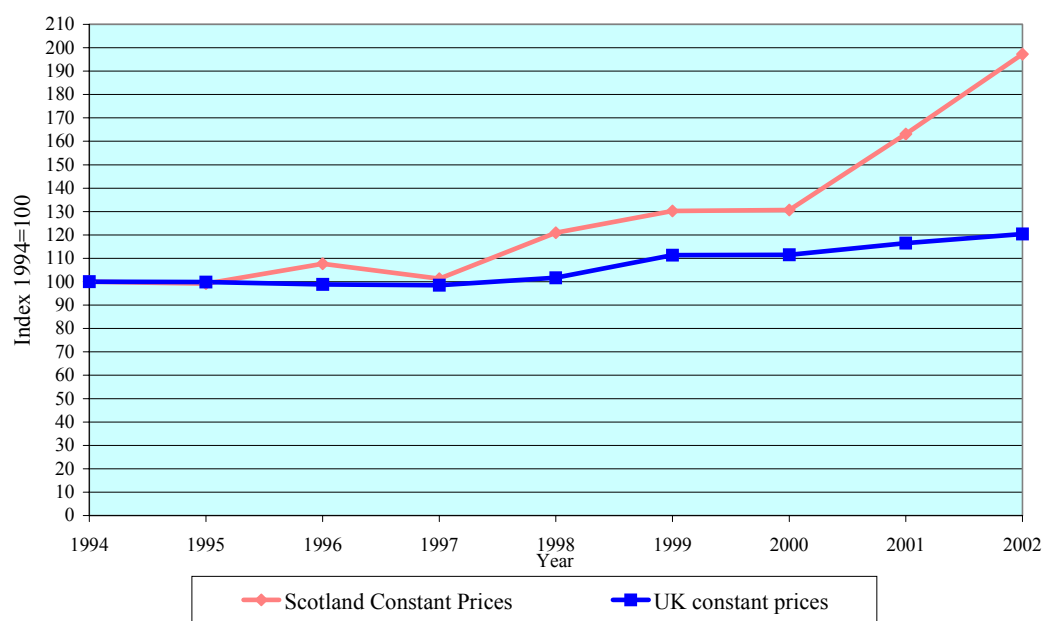
Source: ONS/SE (Table 1) and Employment from ABI

1. Excluding public administration, education and health(SIC 75, 80, 85)

2. UK employment data calculated using ABI employment data for GB + Northern Ireland COE employment

3. 2001 employment and expenditure data revised

Chart A: Expenditure on R & D 1994 =100



Note: Expenditure is adjusted here for price changes, using a GDP deflator.

Gross Domestic Expenditure on R&D in Scotland (GERD)

2.6 In addition to businesses, government establishments (including those managed by the research councils), higher education institutions and not for profit organisations also undertake research. The private non profit sector undertook R&D to the value of £290 million in the UK, 1.5% of the total; as a regional breakdown of this figure is not available the private non profit sector is excluded from Table 2 and the other comparisons in this chapter.

Table 2: Value of Total R&D Undertaken in Scotland and the UK 2002 (£million)

	Businesses (BERD)	Government (GOVERD)	Higher Education (HERD)	Gross Expenditure (GERD)
Scotland	640	238	581	1459
UK	13110	1752	4413	19275
% of UK	4.9%	13.6%	13.2%	7.6%

Source of expenditure: Economic trends article September 2004 Table 14 and Table 15

2.7 While 4.9% of UK business R&D is carried out in Scotland 14% of UK research in government establishments and 13% of all University research is undertaken in Scotland, similar percentages as in the year before. The total value of R&D within these two public sectors in Scotland is higher than the expenditure for research in businesses. For the UK as a whole R&D undertaken in government establishments and higher education institutions amounts to less than half the value of R&D undertaken in businesses.

Comparison with other UK Regions

2.8 The bulk of UK business expenditure on research and development is undertaken in the Regions South East (25%) and East (21%). In these two areas R&D expenditure per employee in 2001 was well over £1,000, and three or four times higher than in Scotland. Table 3 shows the breakdown of expenditure in 2002 for the countries and regions of the UK in order of R&D expenditure per employee. Scotland's expenditure per employee in 2002 reaches nearly 60% of the UK value, 10 percentage points more than a year before. Compared to 2001 the share of the South East and Eastern Regions has dropped from 52% to 46% of the UK total, while all other regions apart from Northern Ireland increased their share.

Table 3: Business R & D Expenditure in 2002 and Qualifications of Workforce

Region	Expenditure (£ million)	Percentage Of Total expenditure in UK	Expenditure per Employee ¹ (£)	BERD as a % of GDP	Percentage of workforce with higher qualifications ²
North East	128	1.0%	184	0.38%	24.2
Yorkshire and Humber	357	2.7%	227	0.48%	24.3
Wales	182	1.4%	244	0.43%	29.4
London	950	7.2%	306	0.50%	37.5
Northern Ireland ³	149	1.1%	358	0.64%	28.2
Scotland	640	4.9%	390	0.77%	33.4
West Midlands	695	5.3%	396	0.79%	24.6
North West and Merseyside	1661	12.7%	754	1.56%	26.4
East Midlands	1063	8.1%	801	1.58%	24.3
South West	1274	9.7%	826	1.63%	29.1
South East	3268	24.9%	1155	2.08%	31.2
Eastern	2741	20.9%	1555	2.98%	25.9
UK³	13110	100%	669	1.24%	28.9

Source: ONS First release DTI, ABI employment, Regional competitiveness indicators

1 excluding public administration, education and health (SIC 75,80,85)

2 percentage of economically active adults aged 18-59/64 with higher education qualifications (NVQ level 4 or above) in autumn 2002

3 Northern Ireland employee data from Northern Ireland Census of Employment

2.9 Table 3 also shows that the level of qualifications of the workforce is not directly related to R&D investment. After London, Scotland has the highest percentage of workers with higher educational qualifications, similar to the South East, but a much lower level of R&D. Qualifications and skills are explored further in Chapter 4.

2.10 As noted above, Scotland's share of UK R&D is substantially higher when gross domestic R&D (undertaken by businesses, government research establishments and higher education institutions) is considered. Table 4 provides details, the Regions are ordered by expenditure per head of population. The level of GERD expenditure per head in Scotland in this measure is nearly 90% of the UK figure, ten percentage points more than previously. As a percentage of GDP, Scotland's total R&D expenditure is only marginally below the UK level.

Table 4: Gross Expenditure on R & D in 2002 (GERD)*

Region	Expenditure (£ Millions)	Percentage of UK Expenditure	Expenditure per head (population) (£)	Gross Expenditure on R&D (GERD) as a % of GDP
North East	293	2%	117	0.87%
Wales	403	2%	138	1.01%
Northern Ireland	248	1%	146	1.06%
Yorkshire and the Humber	759	4%	152	1.01%
West Midlands	966	5%	182	1.16%
Scotland	1459	8%	289	1.75%
London	2244	12%	305	1.18%
North West and Merseyside	2082	11%	307	1.96%
East Midlands	1362	7%	323	2.02%
South West	1693	9%	341	2.15%
South East	4335	22%	539	2.76%
Eastern	3429	18%	633	3.73%
UK	19275	100%	325	1.83%

Source: ONS Population Trends Summer 2003 Tables 1.3 and 1.4 and ONS Scottish analysis on BERD

* excluding private non profit sector

International Comparisons

2.11 Table 5 below shows that expenditure on business research and development in Scotland and the UK is lower than in important competitor countries though ahead of Italy and at about the same level as Ireland. The EU average is 50% higher than Scotland. The OECD average is twice as high and the leading country in the comparison, Sweden, spends a four times higher share of GDP on R&D.

Table 5: International Comparisons 1997 to 2002: BERD as a percentage of GDP

Country	1997 (%)	1999 (%)	2001 (%)	2002(%)
Scotland	0.42	0.53	0.65	0.77
UK	1.18	1.25	1.24	1.26
Germany	1.54	1.70	1.75	1.75
France	1.39	1.38	1.41	1.37
Italy	0.52	0.51	0.55	0.54
Japan	2.04	2.10	2.26	2.32
Canada	1.01	1.07	1.21	1.05
USA	1.91	1.98	2.00	1.87
Ireland ²	0.91	0.87	0.8	0.8
Finland	1.79	2.20	2.42	2.41
Sweden ²	2.65	2.74	3.32	3.32
EU 25 ¹	..	1.19	1.17	1.17
OECD	1.48	1.53	1.58	1.54

Source: OECD Main Science and Technology Indicators and Regional Trends

1. European Union expanded from 15 nations to 25 in 2004. These figures are for the 25 nations. The same table published last year for 2001 data was for the EU15 nations.
2. 2002 data are not available for Sweden and Ireland. 2001 figures are entered here.

Note: ONS and OECD use slightly different GDP figures. The UK 2002 figure of 1.24% from Table 3 is preferred for comparisons within the UK

Funding

2.12 This report mainly discusses research and development activity by type of the enterprise where it is performed (sometimes called ‘intramural R&D’). This section in contrast contains information on where it is paid from. Respondents were asked to identify the source of funding for research and development.

2.13 As Table 6 shows, funding for R&D in Scotland comes predominantly from firms’ own funds or from other enterprises. Compared to the UK as a whole the proportion of funds received from overseas (including any overseas parent company) is smaller than for the UK; the UK government has in 2002 commissioned less business R&D in Scotland than in previous years. Altogether 82% of R&D is funded by UK businesses themselves, compared to 66% in the UK. Charts B and C show the funding composition of business R&D for 2002.

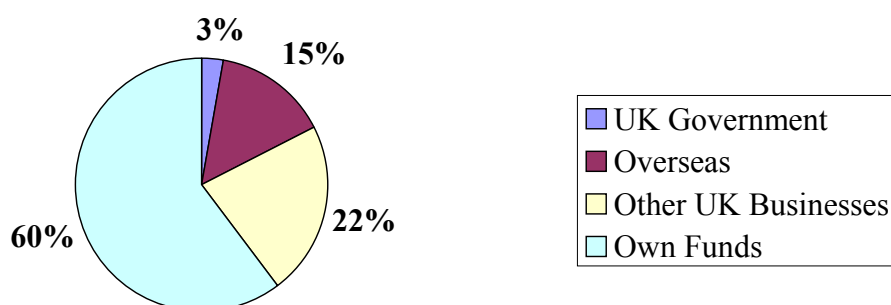
Table 6: Sources of Funding of Business R&D 1995-2002

Source of Funding		1995	1996	1997	1998	1999	2000	2001	2002
UK Government	Scotland	26%	22%	20%	22%	15%	15%	13%	3%
	UK	10%	9%	10%	11%	10%	9%	9%	7%
Overseas	Scotland	21%	24%	24%	22%	18%	23%	16%	15%
	UK	19%	22%	19%	22%	23%	21%	24%	27%
Other UK Business	Scotland	6%	8%	..	9%	22%	22%	20%	22%
	UK	8%	7%	7%	7%	7%	7%	6%	7%
Own Funds	Scotland	47%	47%	46%	47%	46%	50%	51%	60%
	UK	63%	62%	65%	61%	60%	63%	60%	59%

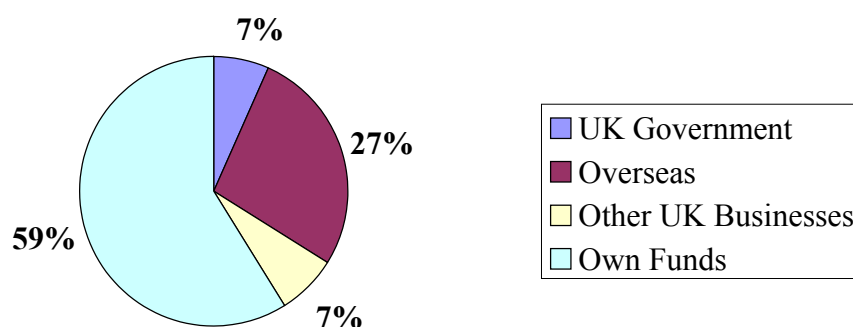
Source: ONS/SE Table5

Charts B and C: Sources of Funding for R&D 2002

**Chart B:
Sources of R&D Funding in Scottish Businesses
2002**



**Chart C:
Sources of Funding for R&D UK 2002**



Commissioned Research

2.14 The survey also collects data on the value of R&D that is contracted out by firms, that is 'extramural R&D' from the viewpoint of the funding firm. Table 7 compares the amounts spent by businesses undertaking R&D on commissioned research with the value of work undertaken by R&D consultancies. These businesses undertake some but not all of the commissioned work. As Table 22 in Appendix 3 shows, R&D consultancies work predominantly for the Chemicals sector, mainly on the development of pharmaceuticals: 89% of R&D undertaken in R&D consultancies supports chemical products. The rest of manufacturing is different: 94% of R&D for non-chemical products is undertaken in-house or by another manufacturing firm (Scottish percentages).

Table 7: Extramural Research and R&D Services 2002

	2002			
	Scotland amount in £million	Scotland % of total R&D spend	UK amount in £million	UK % of total R&D spend
Extramural R&D expenditure	51	8.0%	2,562	19.5%
Of which: commissioned from UK enterprises	30	4.8%	1,294	9.9%
R&D carried out by R&D services sector SIC 73	218	34.1%	3,472	26.5%

Source: ONS/SE (Table 4 and 22)

2.15 As the table shows enterprises undertaking R&D in Scotland tend to sub-contract less compared to the UK (8% of the value of their own research compared to 20% in the UK). Sub-contracted R&D in Scotland amounted to only 2% of the UK total. Compared to 2001 the amount contracted out by Scottish enterprises has risen as it has in the UK. Scottish firms commissioned 59% of their external R&D from UK enterprises.

2.16 The share of R&D undertaken in enterprises specialising in R&D services in Scotland is relatively high, 34% of total R&D, an increase by 10 percentage points from the previous year. The UK figure is 26%, similar to 2001. Although the level of sub-contracting by Scottish R&D providers is lower, Scottish R&D consultancies attract a large part of total Scottish BERD. The pharmaceutical sector is a major user of such contract research. In fact 80% of chemicals and pharmaceuticals R&D is undertaken by consultancies.

2.17 In addition to R&D consultancies other firms absorb some of the R&D that is contracted out. As seen above, £51 million of Research and Development was contracted out by Scottish firms. The total amount of Scottish R&D funded by other UK enterprises however stands at £142 million i.e. far more R&D is undertaken in Scotland than is commissioned from Scotland⁶.

Capital Expenditure

2.18 In 2002 Scotland spent 7% of R&D expenditure on capital goods, compared to the UK figure of 9%. Both the Scottish and UK percentages are lower than in the previous year – 11% and 13% respectively.

⁶ Apart from work funded by other enterprises R&D consultancies will also undertake work funded from overseas and by government.

3 Analysis by Product Group and Sector

Introduction

3.1 Most economic statistics are broken down using the Standard Industrial Classification (SIC), which categorises each firm on the basis of the product which contributes the largest share to the firm's added value.

3.2 In contrast R&D activity is generally tabulated by the *final* product that benefits from R&D. This is the practice adopted in this report. In the following analysis R&D expenditure by product group is compared with total (R&D, administrative and production) employment in the sector that mainly produces the product in question. The aim is to provide a comparative measure for the importance of R&D in Scotland and the UK in each industry. Caveats apply to these comparisons: firms are classified by their main product but may produce other supplementary products. An examination of the Scottish input/output tables shows that in manufacturing a high percentage of each sector's output is their main product. In the services sector this is the case to a lesser degree. The R&D services sector SIC 73 of course undertakes a large amount of work for manufactured products.

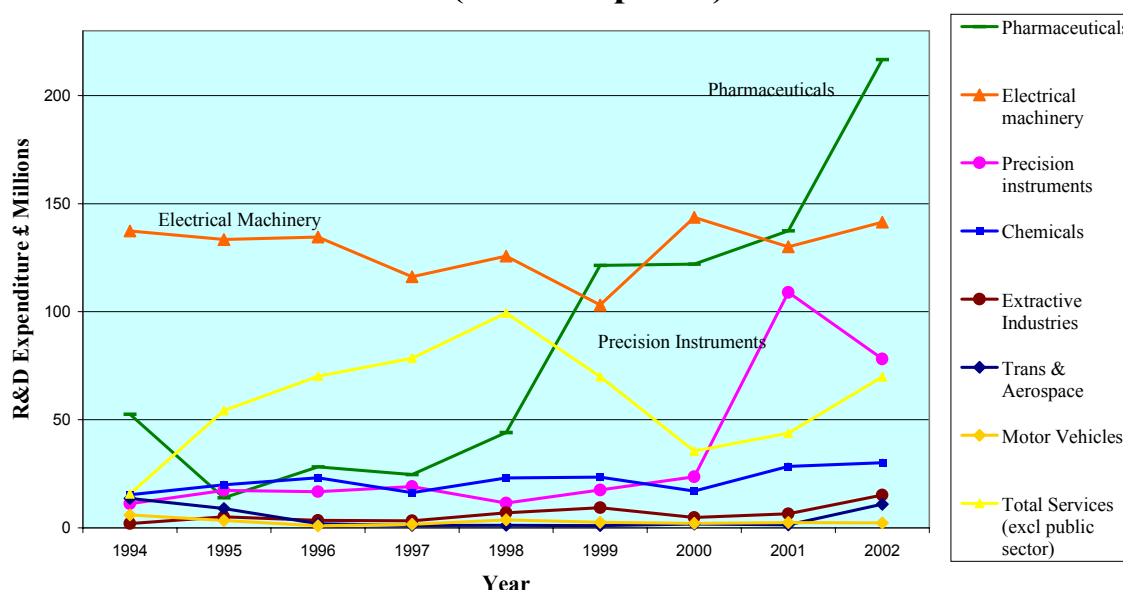
3.3 The following introductory table (Table 8) documents the sectoral composition of the Scottish and UK economies for research intensive sectors. Generally Scotland's share of manufacturing employment is 10% lower than the UK share, and between 25% and 50% lower in the key sectors of chemicals, transport equipment and aerospace and computer and related services. This illustrates a possible link between total employment in research intensive industries and R&D. Although not all R&D is undertaken close to production plants some of it clearly is, particularly experimental development work, where Scotland is weak (see Chapter 5).

Table 8: Percentage employed in selected sectors Scotland and UK 2002

	Scotland %	UK %
Manufacturing total	16.04	17.93
Chemicals, man made fibres	0.60	0.82
Pharmaceuticals	0.31	0.37
Mechanical engineering	2.88	3.41
Electrical machinery	1.91	1.41
Transport equipment & aerospace	0.98	1.88
Selected services:		
Computer and related activities	1.62	2.50
Research and development services	0.55	0.55
Grand total excluding public sector	100.00	100.00

Source: ABI employment and ONS/SE

**Chart D: Expenditure on R&D 1994 to 2002
(constant prices)**



Note: Expenditure is presented in constant prices, using a general GDP deflator.

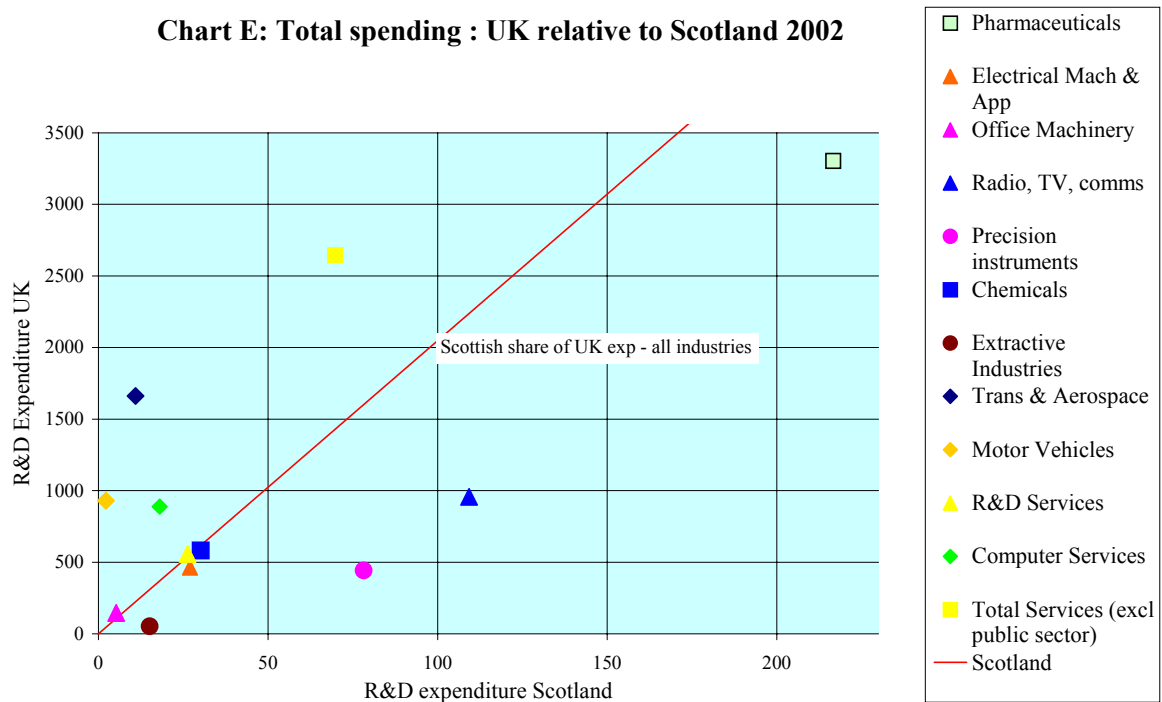
Changes over time

3.4 Chart D shows Scottish R&D expenditure for selected products between 1994 and 2002. The major spenders are the product groups: pharmaceuticals, electrical machinery (which contains electrical machinery and apparatus, office machinery and computers and radio, TV and communications equipment) and precision instruments. R&D expenditure on pharmaceuticals has increased nine fold in real terms between 1997 and 2002 and in fact about half of the total increase in Scottish R&D spending during that period is accounted for by the increase in the pharmaceuticals sector. Electrical machinery products have attracted substantial R&D spending for a number of years. Precision instruments entered the group of R&D intensive products in Scotland for the first time in 2001. This category includes the manufacture of medical and surgical tools, measuring, testing and navigational aids, process control equipment, optical and photographic equipment.

Sector performance

3.5 The following Chart E compares, for each sector, Scotland's share of UK R&D spending with the average of 4.9% (red line). For three products: pharmaceuticals, radio, TV and communications equipment and precision instruments, substantially more than 4.9% of UK R&D is performed in Scotland. These are shown to the right of the red line. This is principally the same position as in 2001, with radio, TV and communications equipment (which includes electronic components) replacing the (related) electrical machinery and apparatus category. For other major R&D spenders in the UK, such as aerospace and other transport equipment, motor vehicles and parts, and computer related services Scotland's share is low. In general comparatively little R&D for service sector products is undertaken in Scotland. Note that for this chart expenditure on electrical machinery has been broken down into the three constituent parts of that sector: electrical machinery and apparatus, office machinery and computers, and radio, TV and communications equipment.

Chart E: Total spending : UK relative to Scotland 2002



Note: Sectors to the right of the line spend more than 4.9% of their UK R&D expenditure in Scotland, sectors left of the line spend less than that percentage.

3.6 Scottish expenditure on R&D was *above £10 million* for the following detailed product groups:

Product group	BERD 2002 (£ million)
Pharmaceuticals, medical chemicals and botanical products	217
Radio, television and communication equipment	109
Precision instruments	78
Machinery and equipment	52
Chemicals. Man-made fibres	30
Electrical machinery and apparatus	27
Research and development services	26
Computer and related activities	18
<i>Extractive Industries</i>	<i>15</i>
<i>Miscellaneous business activities: Technical testing and analysis</i>	<i>15</i>
<i>Other Transport Equipment & Aerospace (excluding motor vehicles)</i>	<i>11</i>

Products shown in italics: these spent less than £10 million in 2001

3.7 The *share of UK BERD is particularly high* (above 10% i.e. twice the overall Scottish percentage) for the following major product groups (each spending over £100 million per annum on R&D in the UK):

Product group	Scotland as % of UK
Precision instruments	17.7%
Radio, television and communication equipment	11.4%

3.8 Extractive industries spend the largest share of their UK expenditure in Scotland: £15 million out of £55 million. For pharmaceuticals 6.6% of the UK budget was spent in Scotland.

3.9 The Scottish *share of R&D expenditure is particularly low*, less than 2.5%, for the following major product groups (each spending over £100 million per annum on R&D in the UK):

Product group	Scotland as % of UK
Food Products and beverages: Tobacco products	2.1%
Computer and related activities	2.0%
Other Transport Equipment & Aerospace (excluding motor vehicles)	0.8%
Agriculture, hunting and forestry: Fishing	0.4%
Motor vehicles and parts	0.2%

3.10 Scotland's share of UK R&D expenditure is still generally low in the services sector at 2.6% of the UK total, an increase from 1.8% in 2001. This includes important areas such as post and telecommunications services (spending over £700 million in the UK) for which a separate Scottish figure is not available.

Financial Services

Scotland has a vibrant financial services sector which employs over 100 thousand people direct, as well as supporting further employment in other related industries. The sector in Scotland, which accounts for over 5 per cent of Scottish output (as measured by value added), has outperformed other sectors of the Scottish economy in recent years with above average trend growth.

The development of financial products may require the input of research and development for activities such as database design, credit scoring and underwriting, as well as security, particularly on-line security, and new systems such as voice recognition technology etc.

These may be developed in-house, contracted out to consultancies or purchased as a ready to use system. The latter would not be counted as R&D in this definition (although it would be an innovation to the enterprise). R&D statistics would measure whether or not financial institutions chose Scotland to develop new approaches to developing, managing or marketing financial products.

In-house R&D by financial institutions in Scotland was valued at £1.5 million in 2002, only 2.6% of the UK total of £57 million. Much of the R&D however may be contracted out. R&D for financial services products is included in the wider category of miscellaneous business activities, technical testing and analysis where Scottish R&D expenditure was £15 million, only 4.2% of the UK total.

R&D Expenditure per Employee

3.11 Further analysis can be undertaken on the basis of the research intensity of a product – shown here as R&D expenditure on the product divided by all employees of the sector mainly producing it. This calculation is undertaken for the UK and for Scotland. The UK expenditure per employee can then be seen as a benchmark: if for a sector the R&D expenditure per employee is lower in Scotland then Scotland's role can be seen as focused

on routine production or assembly work. For some industries the expenditure per employee is higher in Scotland: Scotland is leading in R&D for that industry within the UK.

Table 9: R&D Expenditure on Selected Products 2002

Product or Industry	Expenditure ³			Expenditure per employee ^{1,2,3}		
	Scotland £million	UK £million	% Scotland/ UK	Scotland £	UK £	Ratio UK/ Scotland
Total (excluding public sector)	640	13110	4.9%	390	669	1.7
Total Manufacturing	552	10140	5.4%	2093	2885	1.4
of which:						
Pharmaceuticals	217	3304	6.6%	41903	45059	1.1
Chemicals/ Man Made Fibres	30	583	5.2%	3076	3638	1.2
Office Machinery & Computers	5	146	3.6%	523	3607	6.9
Electrical Machinery and Apparatus (excluding computers and comms equipment)	27	462	5.8%	2742	3151	1.1
Radio, Television and communication equipment	109	957	11.4%	9456	10683	1.1
Precision Instruments	78	442	17.7%	5968	3455	0.6
Motor Vehicles & Parts	2	929	0.2%	537	4428	8.2
Other Transport Equipment and Aerospace (Excluding Manufacture of Motor Vehicles)	11	1662	0.7%	920	10537	11.5
Extractive Industries	15	52	29.1%	659	822	1.2
Total Services (excluding public sector)	70	2645	2.6%	129	383	3.0
of which:						
Computers and related activities	18	888	2.0%	678	1815	2.7
Research and Development	26	558	4.7%	2912	5166	1.8

Source: ONS/SE Analysis Table 2 and ABI

1. Excluding public administration, education and health(SIC 75, 80, 85)
2. UK employment data calculated using ABI employment data for GB + Northern Ireland COE employment
- 3 At current prices

Note: The table compares R&D expenditure on a product with employment in the sector mainly producing that product. As explained in the text this comparison works well for manufacturing, but less well for services.

R&D as a Percentage of Turnover

3.12 The extent to which the sectoral composition of the industry influences R&D spending is shown clearly by the research intensity for manufactured products, measured as R&D relative to sales. In 2002 in the UK, £3.20 out of every £100 of manufactured products sold was invested in R&D. However for pharmaceuticals, medical chemicals and botanical products the R&D content was over 10 times as much, £36.30 out of every £100 of sales revenue, and the spend for aerospace was £11.70 per £100 of sales revenue.

3.13 For Scotland the above data are not available. Research intensity for products can alternatively be measured by comparing the turnover of each industry with the research expenditure on its major product. As noted above this comparison is not exact, as not all products are made by the same industry sector, but in manufacturing the overlap is high, around 90%. Data for 2002 on turnover are not yet available for Scotland: Table 10 relates to 2001.

Table 10: Research Intensity: R&D Spending as a Percentage of Turnover, Selected Industries 2001

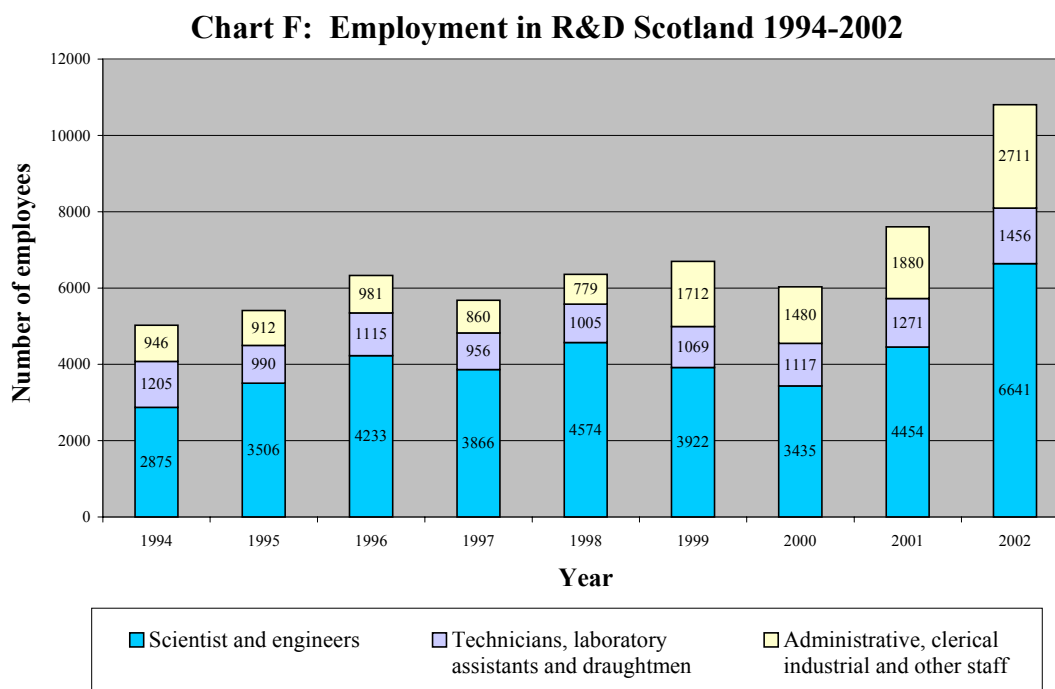
Industry/Sector	Scotland R&D Expenditure (£Million)	% of Turnover	
		Scotland	UK
Pharmaceuticals	134	..	19.6%
Chemicals/ Man Made Fibres	28	..	1.6%
Office Machinery and Computers	6	0.1%	0.9%
Electrical machinery and apparatus	103	9.1%	3.2%
Radio, Television and communication equipment	17	0.4%	5.1%
Precision instruments	106	6.9%	4.0%
Motor Vehicles & Parts	2	0.5%	2.2%
Other Transport Equipment & Aerospace	1	0.1%	7.5%
Extractive Industries	6	0.0%	0.1%

Note: ABI Turnover data are not available for 2002

4 Employment in Business R&D in Scotland

4.1 This section looks at the role of the people employed in R&D in Scotland. The 901 enterprises identified as performing R&D activities in Scotland in 2002 employed 10,808 staff in R&D, 42% more R&D employment than in 2001.

4.2 The staff can be analysed by their type. Chart F shows the employment by type in R&D for Scotland. The 6,600 scientists and engineers account for the majority of total employment.



4.3 Surprisingly few scientists and technicians in employment actually work in R&D: 9% in Scotland, 11% in the UK – Table 11. Apart from research, these occupations may find employment in production and service and consulting activities not classed as research. However, many people who classify themselves as scientists and engineers do not have a degree. One third of the 19,000 degree qualified scientists and engineers working in Scotland in the private sector work in R&D. See Table 15 for further labour market data on occupational groups relevant for R&D.

Table 11: Percentage of scientists and engineering occupations¹ working in R&D: Scotland & UK 1995-2002

Scotland	1995	1996	1997	1998	1999	2000	2001	2002
Percentage working in R&D								
Scientists & Engineers	7%	8%	7%	9%	7%	6%	6%	9%
Technicians, laboratory assistants and draughtspersons	5%	5%	4%	4%	5%	6%	4%	4%
UK	1995	1996	1997	1998	1999	2000	2001	2002
Percentage working in R&D								
Scientists & Engineers	12%	11%	10%	11%	10%	9%	9%	11%
Technicians, laboratory assistants and draughtspersons	13%	12%	11%	13%	12%	11%	8%	8%

Source: ONS/SE Analysis Table 6 and Labour Force Survey

1. Overall employment of Scientists & Engineers and Technicians etc comes from LFS Autumn quarter for each year.

Expenditure per R&D Employee

4.4 Table 12 shows the Scotland and UK expenditure per R&D employee for 1995-2002. It shows that expenditure per R&D employee in Scotland has been consistently below the UK figure, by £19,300 in 2002.

4.5 Expenditure on salaries and wages as a proportion of total BERD has been similar in Scotland and the UK, just under half in 2002. The gap in expenditure per employee on salaries and wages between Scotland and the UK is £7,600; this is larger than in the past few years.

Table 12: Total Scotland and UK Expenditure per R&D Employee 1995-2002

	£ thousands							
	1995	1996	1997	1998	1999	2000	2001	2002
Scotland								
Total	49.7	47.7	51.2	56.2	58.7	66.3	67.4	59.2
Capital total	3.1	2.3	3.7	4.8	5.7	8.4	7.6	4.0
Current total	46.6	45.4	47.5	51.4	53.0	57.8	59.8	55.2
Of which:								
Salaries and wages	19.3	20.2	20.6	22.1	23.6	26.2	29.4	27.0
Other	27.3	25.2	26.9	29.3	29.4	31.7	30.4	28.2
UK								
Total	62.9	65.5	69.8	68.5	73.9	79.4	83.4	78.5
Capital total	7.0	6.8	8.1	7.0	8.0	8.1	11.1	7.0
Current total	55.9	58.7	61.7	61.4	65.9	71.2	72.4	71.5
Of which:								
Salaries and wages	24.7	26.1	26.9	27.1	29.4	31.9	32.8	34.5
Other	31.2	32.6	34.8	34.3	36.5	39.4	39.6	37.0

Source: ONS/SE Analysis Table 10 and ABI

1. Excluding public administration, education and health(SIC 75, 80, 85)

Product Groups

4.6 The first column of Table 13 shows that R&D into pharmaceuticals products employed 29% of the Scottish R&D workforce, considerably more than in the UK (17%). R&D for service sector products on the other hand employed a higher proportion in the UK than in Scotland (23% compared to 13%). The percentage of scientists and engineers in the R&D workforce varies depending on the product group. Scotland has a smaller share of scientists and engineers employed in pharmaceuticals than the UK, but in the electrical machinery sector the proportion of scientists and engineer is higher in Scotland.

Table 13: R&D employment by product groups and type: Scotland & UK 2002

	R&D employment	% Scientists and engineers	% Technicians, laboratory assistants and draughtsmen	% Administrative, clerical and other
Scotland				
Manufacturing	9215	61%	13%	26%
Chemicals - Of Which:	3591	34%	17%	49%
<i>Chemicals. Man-made fibres</i>	478	43%	47%	10%
<i>Pharmaceuticals</i>	3114	32%	12%	55%
Mechanical Engineering	805	75%	8%	17%
Electrical Machinery	3293	84%	7%	9%
Transport equipment & aerospace	256	66%	23%	11%
<i>of which: Motor Vehicles & Parts</i>	59	56%	20%	22%
Services (excluding public sector)	1394	62%	18%	20%
UK				
Manufacturing	124256	62%	19%	19%
Chemicals	37573	48%	25%	27%
<i>Chemicals. Man-made fibres</i>	9000	44%	33%	11%
<i>Pharmaceuticals</i>	29000	48%	21%	31%
Mechanical Engineering	15575	76%	11%	12%
Electrical Machinery	24016	76%	13%	12%
Transport equipment & aerospace	28647	62%	19%	19%
<i>of which: Motor Vehicles & Parts</i>	11000	64%	18%	18%
Services (excluding public sector)	38621	64%	16%	20%

Source: ONS Scottish analysis Tables 7 and 7A

4.7 Table 14 compares the employment in R&D with the total employment by product group. This follows a similar pattern as BERD expenditure, described in Section 3. Pharmaceuticals and electrical machinery account for the majority of R&D employment and expenditure in Scotland. In the UK these, plus services and the transport sector (including aerospace) are large in terms of R&D expenditure and employment. Although small compared to total services employment, the share of R&D employment in services is three times as high in the UK than in Scotland.

Table 14: Percent of R&D employment compared to overall employment 2002

	Scotland			UK		
	Employment in R&D	Total Employment	Percent employed in R&D	Employment in R&D	Total Employment	Percent employed in R&D
Total Manufacturing	9215	263553	3.5%	124256	3514874	3.5%
Total Other Sectors¹	1593	1379742	0.1%	42669	16084817	0.3%
Grand Total Excluding Public Sector	10808	1643294	0.7%	166924	19599745	0.9%
Chemicals (of which):	3591	14971	24.0%	37573	233576	16.1%
Chemicals. Man-made fibres	478	9800	4.9%	9000	160250	5.6%
Pharmaceuticals, medical chemicals and botanical products	3114	5171	60.2%	29000	73326	39.5%
Mechanical Engineering	805	47293	1.7%	15575	669187	2.3%
Electrical Machinery	3293	31406	10.5%	24016	276698	8.7%
Transport equipment & aerospace (Including Motor Vehicles & Parts)	256	16037	1.6%	28647	367498	7.8%

Source: ONS/SE Analysis and Labour Force Survey

1. Excludes Public Sector

Labour market and skills

4.8 Table 15 collates some labour market indicators for the main occupational groups employed in R&D.

4.9 The first section of the table shows that of all those that describe their occupation as scientist, engineer, IT professional or scientific technician in the private sector, a higher proportion in Scotland work in the energy and water sector while the UK proportion working in finance and business services is higher. This might reflect employment in the R&D services sector (a sector too small to isolate) but more likely it indicates that a proportion of the occupational groups that might work in R&D actually have found employment in non research intensive sectors in the UK.

4.10 The percentage of this group with a degree is the same in Scotland and the UK, however in Scotland more have other higher educational qualifications (SVQ levels 4 to 6), such as HNCs.

4.11 The second block of the table looks at people in the workforce who describe themselves as scientists or engineers: Again a higher percentage of Scots have higher educational qualifications including HNCs.

4.12 The following parts of the table show the jobs done by people who have relevant qualifications. Employees with science degrees as their highest qualification are more likely to work as scientists/engineers if they live in Scotland than in the UK as a whole. However the reverse is the case for the broader group of occupations (scientists, engineers, IT professionals and private sector teachers) which in the UK absorbs a larger percentage of people with science degrees. One possible explanation here is that in Scotland there are fewer alternative jobs (outside science and engineering) for people with science degrees.

Table 15: Some labour market data relevant to R&D

Occupations and qualifications	Scotland 2002	UK 2002
Scientists, engineers, IT professionals and scientific technicians		
As percentage of the private sector work force	6.2%	6.0%
With degree	42%	42%
With higher educational qualifications (including HNC etc)	66%	58%
Working in energy and water sectors	13%	5%
Working in manufacturing	33%	33%
Working in financial and business services	37%	41%
Scientists and engineers		
As percentage of the private sector work force	3%	2%
With degree	48%	46%
With higher educational qualifications (including HNC etc)	70%	64%
Private sector employees with science degrees		
Working as scientists or engineers	22%	18%
Working as scientists, engineers, IT professionals, technicians or teachers	32%	35%
Private sector employees with any degree		
Working as scientists or engineers	7%	6%
Working as scientists, engineers, IT professionals, technicians or teachers	20%	21%

Source: SE analysis of the LFS

4.13 Further data were obtained from Futureskills Scotland from the Employers Skill Survey 2002. In research intensive industries⁷ the vacancy rate was only half of the overall rate. Virtually no hard-to-fill vacancies have been identified in Scotland in these sectors and the skill gap in existing staff is half the overall rate. In computer services and research services however, the vacancy rate, the hard-to-fill vacancy rate and the skill gap are all higher than in the economy as a whole. For professional and associate professional occupations the three values are generally lower than in the economy as a whole, with the exception that vacancy rates are higher for associate professional occupations.

4.14 Table 16 compares the number of scientists and engineers in R&D in each year to the number of university leavers in scientific and engineering subjects in that year. Scotland has about 10% of the UK University leavers in scientific and engineering subjects and about 6% of the UK employment as scientists and engineers in R&D.

⁷ SIC 24,30,31,32,34,35

Table 16: Scotland as a percentage of UK R&D employment and university leavers in science and engineering subjects: 1995 – 2002

	1995	1996	1997	1998	1999	2000	2001	2002
Scientists and engineers in R&D	4.3%	5.2%	4.7%	5.0%	4.3%	4.0%	4.8%	6.3%
University leavers in science and engineering subjects	n/a	n/a	10.5%	10.4%	9.7%	9.6%	9.7%	10.3%

Source: ONS/SE (Table 6) and Higher Education Statistics Agency (HESA)

4.15 The factors examined in this section suggest that from a labour market and skills perspective Scotland is certainly not worse placed than the UK as a whole for undertaking R&D:

- In terms of qualifications Scotland fares slightly better
- Scotland share of students graduating in scientific subjects is far greater than its share of R&D employment. This can be due to a combination of:
 - Science graduates leaving Scotland,
 - Scottish science graduates not working in their direct field (this seems to be the case less in Scotland than in the UK as a whole – Table 15)
 - Scottish scientists and engineers working in their field but not in R&D (Table 11).

5 Experimental Development / Defence

Experimental Development

5.1 In Scotland in 2002 one third of current R&D expenditure was used for experimental development, in the UK 52%. The gap between Scotland and the UK has narrowed since the previous year (when the share of experimental development spending in Scotland was historically very low): in 1999 and 2000 roughly half of all Scottish BERD supported experimental development.

5.2 In 2002 some projects in electrical machinery and mechanical engineering seemed to have matured into the experimental development phase. Following a sharp rise in Scottish R&D expenditure in pharmaceuticals few of these projects appear to have reached the experimental development phase. Clinical trials will generally be counted as experimental development. Trials undertaken by an NHS hospital but paid for by a pharmaceutical company would not be included here as the work is undertaken by a government establishment. However if a pharmaceutical company carries out its R&D within a hospital but actually performs the work itself, then it would be included here.

5.3 In general, projects undertaken in Scotland seem to be younger. In addition, Scotland probably tends to be chosen as a location for projects that will benefit from the science base at universities rather than local manufacturing capacity. Table 17 shows a comparison of experimental development expenditure for Scotland and the UK.

Table 17: Experimental Development Expenditure on Selected Products: 2002

Selected Product Group	Percentage of Current Expenditure on Experimental Development	
	Scotland	UK
Total	34%	52%
Chemicals (incl Pharmaceuticals)	19%	49%
Mechanical Engineering	82%	51%
Electrical Machinery (including computers and communications equipment)	50%	60%
Transport Equipment & Aerospace	81%	66%
Services	33%	54%

Source: ONS/SE analysis Table 3

Civil and Defence R&D Expenditure

5.4 The percentage of Scottish R&D used for civilian purposes has increased from around 80% in 1999 to 95% in 2002. In the UK, this figure has moved around a value of 85%, reaching 87% in 2002. The number of jobs in Scottish defence R&D is now less than 500.

6 Size, Age and Ownership of Firms Performing R&D in Scotland

6.1 For the 2002 survey, 901 enterprises were identified as undertaking R&D in Scotland. This included 55 companies that employed 400 or more people in the UK. The total number of R&D performers identified has grown substantially, by 242 firms or 37%, compared to the previous year. In the UK 24% more firms were found to undertake R&D. As previously, around half of these firms supported manufactured products and the remainder provided a variety of services.

Size

6.2 The number of small (0-99 employees) firms that have been identified as undertaking R&D in Scotland has increased by 42% over the year. Table 18 provides the details of the 2002 size breakdown.

Table 18: Number and Size of Businesses Performing R&D: Scotland 2002

Sector	Total number of Companies	UK employment sizeband		
		0-99 employees	100-399 employees	400 + employees
All Sectors	901	691	155	55
Of which: Manufacturing	427	258	124	45

Source: ONS/SE Analysis Table 15

6.3 As one enterprise may undertake R&D in several of the Regions of the UK a comparison between Scotland and the UK on the basis of number of enterprises would be misleading. Not too much should be read into the figures. The list of R&D firms is compiled from a variety of sources and while it reliably records larger R&D providers, very small R&D providers who have little impact on the final expenditure figure are not reliably included or excluded. The main focus of the survey is expenditure, not number of firms.

6.4 Larger companies of course account for most R&D spending: in 2002 firms with over 400 employees undertook 56% of all Scottish R&D. However this is significantly less than in the UK as a whole (71%). In particular a higher proportion of R&D in Scotland is done by medium sized firms. As Table 19 shows, the difference is much larger for services products: more than two thirds of R&D was undertaken by small firms (a quarter in the UK).

Table 19: Expenditure by Size¹ of Business: Scotland and UK 2002

	Total Expenditure £m	0-99 employees % of £m total	100-199 employees % of £m total	400+ employees % of £m total
Scotland	640	109 17%	175 27%	356 56%
Of which:				
Manufacturing	552	58 10%	151 27%	343 62%
Services	70	48 69%	13 19%	8 12%
UK	13110	1539 12%	1922 15%	9249 71%
Of which:				
Manufacturing	10140	839 8%	1411 14%	7891 78%
Services	2645	688 26%	490 19%	1202 45%

Source: ONS/SE Analysis Table 12 and MA14 Table 19

¹ Sizebands are for total UK employees

6.5 This could indicate that whereas a number of large UK and international R&D performers in the manufacturing sector maintain significant R&D branches in Scotland, equivalent sized firms in the services field do not.

6.6 This finding correlates with the low level of R&D spending for service products in Scotland, as already noted.

6.7 Table 20 contains the analysis of employment by firm size. The findings correlate with the results on expenditure.

Table 20: R&D Employment by Size¹ of Business: Scotland and UK, 2002

	Total Employment FTE	0-99 Employees % of FTE Total	100-399 Employees % of FTE Total	400 + Employees % of FTE Total
Scotland	10 808	2 024 19%	3 454 32%	5 330 49%
of which:				
Manufacturing	9 215	983 11%	3 101 34%	5 131 56%
Services	1 394	986 71%	253 18%	155 11%
UK	167000	27000 16%	30000 18%	109,000 65%
of which:				
Manufacturing	124000	14000 11%	22000 18%	87,000 70%
Services	39000	12000 31%	7000 18%	18,000 46%

Source: ONS analysis Table 12A

¹ Sizebands are for total UK employees

6.8 Table 21 gives an indication of the level of concentration of R&D activity. It shows that in 2002 the 15 largest R&D firms of the UK were virtually absent from Scotland. The first 100 R&D performing firms undertook 60% of Scottish R&D but 70% of UK R&D. Since 2001 the share of the top 20 firms has stayed the same in Scotland but has declined in the UK. The share of the top 100 firms has declined in Scotland and the UK.

6.9 Table 21 also shows how government procurement benefits, in Scotland and the UK, predominantly the largest firms. The top 10 firms receive more than half of government R&D contracts by value.

Table 21: Level of Concentration of R&D 2002

	% of all R&D expenditure		% of expenditure funded by UK gov	
	Scotland	UK	Scotland	UK
top 10 enterprise groups	4%	35%	56%	52%
top 15 enterprise groups	4%	40%	58%	56%
top 20 enterprise groups	34%	45%	62%	67%
top 100 enterprise groups	60%	70%	66%	89%
all enterprise groups	100%	100%	100%	100%

Source: ONS/SE analysis Table 11

Note: top enterprise groups when sorted in order of R&D expenditure in the UK

Age

6.10 Only a small proportion of Scottish R&D is undertaken in firms that are less than 10 years old. This is particularly true for manufacturing (Table 22). While 18% of R&D performing firms in manufacturing are under 10 years old, they only produce 7% of R&D output. In services around half of the firms are young, producing around half of R&D output.

Table 22: Age of firm performing R&D in Scotland 2002

Firms performing R&D in Scotland	% young* firms	% of expenditure in young* firms
All products	37%	11%
Manufactured products	18%	7%
Service products	55%	45%

Source: ONS/sSE analysis Tables 18 and 19

*less than 10 years old

Country of Ownership

6.11 Table 23 shows that over half of R&D in Scotland is undertaken by firms headquartered in the USA: in 2001 these firms spent £348 million – 54% of the total - and employed nearly 6,000 staff on R&D activities in Scotland. Firms from the US have expanded the amount of Scottish R&D considerably since the previous year and have increased their share from by 10 percentage points. In the UK as a whole US based firms accounted for 23% of R&D.

Table 23: R&D expenditure by country of ownership 2002

Performed in Scotland		
Country of ownership	Expenditure	
	£m	percent
Scotland	157	25%
Rest of the UK	43	7%
United States	348	54%
Other EU	69	11%
Rest of the World	23	4%
Total	640	100%
Performed in UK		
Country of ownership	Expenditure	
	£m	percent
UK	8127	62%
United States	3016	23%
Other EU	1287	10%
Rest of the World	680	5%
Total	13110	100%

Source: ONS/Seanalysis table 13 and Table 22 MA14

6.12 The proportion of R&D undertaken in Scotland by Scottish firms was in 2002

All products	25%
Manufacturing	18%
Chemicals	25%
Mechanical engineering	9%
Electrical machinery	11%
Transport equipment & aerospace	30%
Other manufactured products	15%
Services	70%

Location of managerial control in UK

6.13 Here, the location of the head office of the enterprise undertaking R&D in Scotland is examined. For foreign owned enterprises this is the location of the UK chief office. This analysis is different from the work in last year's report, which was based on the location of intermediate administrative centres, not necessarily the UK head office.

6.14 Table 24 below and Table 17 in Appendix 3 show that 44% of the R&D undertaken in Scotland is controlled from a Scottish location. One third is controlled by a head office in the South East and the remainder from somewhere else in the UK.

6.15 All other UK regions, with the exception of East Midlands, control a larger percentage of their R&D locally. However the list of regions that control most of their R&D locally contains a mixture of high and low performers: West Midlands, South East, Yorkshire and Humber, Northern Ireland, London and Wales all control over 70% of R&D locally. Only the South East has a more research intensive economy than the UK average and West Midlands is close to the UK average. Local control is not directly correlated with R&D intensity. Of course it is the large R&D firms that have a head office outside Scotland: the 56% of Scottish R&D controlled from a head office located in the rest of the UK is undertaken by only 58 firms. 843 R&D firms do have a Scottish head office (Table 21, Appendix 3).

Table 24: Location of Head Office / Location of Performing Unit 2002

Value of R&D (£ million)	Head office in Scotland	Head office outside Scotland	Total undertaken
Undertaken in Scotland	285	355	640
Undertaken elsewhere in UK	88	12,382	12,470
Total by head office location	373	12,737	13,110

Source: ONS/SE (Table 17)

6.16 The same analysis for other regions shows interesting linkages. For the purpose of this analysis a region is called self contained if 70% or more of its R&D is controlled from a local head office. Linkages are shown as major (20% or more, shown in bold) or minor (10% or more).

Region:	Linked with:
North East	London
North West	London
Yorkshire and Humber	self contained
East Midlands	West Midlands
West Midlands	self contained
Eastern	London
London	self contained, South East
South East	self contained
South West	London
Wales	self contained
Scotland	South East
Northern Ireland	self contained

Location in Scotland

6.17 Table 23 in Appendix 3 shows R&D expenditure analysed by local authority area. The top areas chosen by businesses as locations for their R&D are shown in Table 25.

Table 25: Five main areas for undertaking R&D in Scotland 2002

Area	R&D £ million	% of Scotland
West Lothian	191	30%
City of Edinburgh	126	20%
Dundee City	58	9%
North Lanarkshire	55	9%
South Lanarkshire	38	6%

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<http://www.scotland.gov.uk/BusinessStats>

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http://www.statistics.gov.uk/about/national_statistics/default.asp National Statistics are produced to high professional standards. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference.

Appendix 1 - Links and Sources

All sources have been designated as National Statistics, except where indicated (not NS).

Basic sources:

Scottish Executive BERD Scotland 2001 <http://www.scotland.gov.uk/library5/enterprise/berd01-00.asp>
Scottish Executive BERD 2000: <http://www.scotland.gov.uk/stats/bulletins/berd-00.asp>

ONS first release BERD 2002: <http://www.statistics.gov.uk/pdfdir/berd1103.pdf>
ONS economic trends GERD 2002: <http://www.statistics.gov.uk/cci/article.asp?ID=940>
ONS detailed BERD analysis 2002:
http://www.statistics.gov.uk/downloads/theme_commerce/MA14_2002.pdf

Not NS:

OECD STI Scoreboard: <http://www1.oecd.org/publications/e-book/92-2001-04-1-2987/>
OECD Frascati Manual: <http://www1.oecd.org/publications/e-book/9202081E.PDF>
OECD Main Science and Technology Indicators 2003, available from the OECD.
<http://www.oecd.org/home/>

Not NS:

DTI R&D scoreboard: http://www.innovation.gov.uk/projects/rd_scoreboard/introfr.html
DTI Government expenditure on R&D: <http://www.ost.gov.uk/setstats/index.htm>
DTI regional competitiveness indicators: <http://217.154.27.195/sd/rci/index.htm>.

Detailed Sources and references:

UK results of the Research and Development survey are published in the ONS publication “Research and Development in the UK – Business Monitor MA14”.

http://www.statistics.gov.uk/downloads/theme_commerce/MA14_2002.pdf

The ONS first publish the UK data on the Business Monitor then they perform special analysis on the Scottish firms in the survey. The results of the special analysis form the basis of this report and tables comparing it with the UK final results are published in Appendix 3.

Economic Trends article published September 2004 on “Research and Experimental Development (R&D) Statistics 2002” was the source of data on expenditure and employment data on research and development activity, in particular in the higher education and government sectors. <http://www.statistics.gov.uk/cci/article.asp?ID=940>

Employment data came from 2 different sources: employment by industry came from the Annual Business Inquiry and employment by job type came from the Labour Force Survey.

Population data came from the GRO(Scotland) website

<http://www.gro-scotland.gov.uk/grosweb/grosweb.nsf/pages/02-mid-year-tables> .

Not NS:

Innovation system: Appendix 1 of the 2001 report:
<http://www.scotland.gov.uk/library5/enterprise/berd01-08.asp>.

Research expenditure in the higher education and government sector:

<http://www.ost.gov.uk/setstats/3.htm>.

Not NS:

Commercialisation activities of universities: <http://www.scotland.gov.uk/about/ASD/ELL-EAS5/00018745/Summary.aspx>

Community Innovation Survey regional results:

<http://www.dti.gov.uk/iese/regional2001b.pdf>.

Not NS:

Scottish data on patents and innovation: <http://www.scotland.gov.uk/stats/ses2003/ses03-13.asp>

Details of the methodology of collecting R&D data are given at:

http://www.statistics.gov.uk/downloads/theme_commerce/MA14_2002.pdf

Scottish data about the labour market

<http://www.scotland.gov.uk/about/ELLD/EI/00015648/page2115700549.aspx>

Scottish data on graduates and diplomates:

<http://www.scotland.gov.uk/about/ASD/ELL-EAS6/00017875/page830054467.aspx> .

Revision to BERD 2001: Table 17 of

http://www.statistics.gov.uk/downloads/theme_commerce/MA14_2002.pdf

Appendix 2: Sector Summary

Introduction: This appendix summarises the main findings for selected products and sectors. The product groups featured have been selected on the basis of their potential for R&D expenditure, demonstrated in the rest of the UK or abroad.

Research effort is directed to different products in the UK than elsewhere. The most researched products in the OECD are electronics (14%), pharmaceuticals (7%), precision instruments (6%) office machinery (5%) and aerospace (4%). These are classified by OECD as the high technology industries. Among the medium technology industries R&D for motor cars is probably also considerable.

In the UK R&D for pharmaceuticals (25%) and aerospace (10%) are relatively more important, followed by radio, TV and comms equipment (including electronic components) and motor vehicles. Percentages in brackets are the share of total R&D.

In the following the employment and turnover statistics for sectors have been compared with R&D expenditure for the sectors' products.

Pharmaceuticals: This is the major UK R&D spender – UK R&D expenditure was £3.3 billion in 2002, one quarter of all UK expenditure on R&D. Scottish R&D spending was £217 million, 7% of the UK total, 60% more than in 2001. The sector employed 5,200 people in Scotland and spent £42,000 per industry employee on R&D, nearly the same as in the UK. As a percentage of sales R&D expenditure weighed in at 36% in the UK. R&D expenditure in Scotland for pharmaceuticals has significantly increased from 1999 onwards, reached a level of some £120 million, and has increased again in 2002 to over £200 million, contributing a third to total Scottish business R&D. In 2002 3,100 people undertook R&D for pharmaceutical products in Scotland (including research consultancies); Scottish spending per R&D employee was lower than in the UK, £70,000 compared over £110,000 in the UK.

Transport equipment (excluding cars) and aerospace: Scottish R&D spending in 2002 was £11 million, only 0.7% of the UK total of £1.7 billion. The sector employed 12,000 people in Scotland (including 6,000 in shipbuilding and 5,500 in aerospace) and spent only £900 per employee on R&D – in the UK £10,500 were spent per employee, mainly on R&D in the aerospace sector. For Scotland the R&D statistics for shipbuilding and aerospace cannot be separated for confidentiality reasons. Over the past five years expenditure on R&D in other transport equipment (excluding cars) has been low in Scotland, between £1 million and £2 million per annum, but rising to £11 million in 2002. In the UK this sector is a major R&D spender but neither shipbuilding nor aerospace spend comparable amounts in Scotland, despite a considerable manufacturing presence. Around 200 people undertook R&D for the sector in Scotland; expenditure per R&D employee was £55,000 compared to £95,000 in the UK.

Manufacturing of motor vehicles and parts: Scottish R&D spending was £2.2 million, only 0.2% of the UK total. The sector employed about 4,000 people in Scotland and spent £540 per industry employee on R&D – in the UK £4,400 were spent per employee. Over the past five years Scottish expenditure on R&D for motor vehicles has varied between £1.9 million and £3.4 million per annum. In the UK this sector spends £930 million per annum

on R&D. About 60 people undertook R&D for that sector in Scotland, the expenditure per R&D employee was £38,000 compared to £84,000 in the UK.

Electrical machinery and apparatus / radio, TV and communications equipment including electronic components / precision instruments: These sectors have been combined as there has been considerable volatility in the past few years in these related areas. R&D for Machinery and Apparatus has varied during the past four years between £26m and £115m, radio TV and comms equipment has varied between £15m and £109m and precision instruments between £16m and £106m. In combination R&D in the three sectors has increased gradually from £102m in 1999 to £214m in 2002. The rapid changes that have been observed are due to projects starting and finishing, not re-coding of ongoing activities. Scottish R&D spending in this area was 11% of the UK total. The sectors employed 34,500 people in Scotland and spent £6,200 per employee on R&D – in the UK £5,000 were spent per industry employee. 4,000 people worked in R&D in these three sectors in Scotland giving a spend of £54,000 per R&D employee, compared to £66,000 per employee in the UK.

Office machinery and computers: Scottish R&D spending was £5 million, 4% of the UK total. The sector employed 10,000 people in Scotland, a quarter of the UK total, and spent £530 per employee on R&D – in the UK £3,600 are spent per employee. This sector maintained a considerable manufacturing presence in Scotland in 2002, but spending was low in Scotland compared to the UK. R&D employment of 40 people contrasts with UK employment of 2,000.

All services: Scottish R&D spending was £70 million, 2.6% of the UK total. In Scotland the sector spent £130 per employee on R&D – in the UK £380 were spent per employee. R&D employment in Scotland was 1,400, giving expenditure per R&D employee of £50,000 compared to £68,000 per employee in the UK. In Scotland most R&D for service sector products was undertaken by small Scottish based firms, in contrast to the manufacturing sector, where large foreign owned firms dominate.

Appendix 3: Detailed Tables

Expenditure & Employment Data for Research & Development in Scottish Businesses

Table 1	Expenditure on R&D Performed in Scottish and UK Businesses: Broad Product Groups, Current Prices 1994 to 2002
Table 1A	Expenditure on R&D Performed in Scottish and UK Businesses: Broad Product Groups in Real Terms (2002 constant prices) 1994 to 2002
Table 2	Expenditure on R&D Performed in Scottish and UK Businesses: Detailed Product Groups 1994 to 2002
Table 3	Current Expenditure on R&D Performed in Scottish and UK Businesses: Broad Product Groups 1999 to 2002
Table 4	Extramural Expenditure on R&D Performed in Scottish and UK Businesses: Broad Product Groups 1999 to 2002
Table 5	Sources of Funds for R&D Performed within Scottish and UK Businesses 1994 to 2002
Table 5A	Source of Funds for R&D performed within Scottish and UK Businesses Broad Product Groups, 2001 and 2002 (see note 3)
Table 6	Employment on R&D Performed within Scottish and UK Businesses By job type 1994 to 2002
Table 7	Employment in R&D Performed in Scottish and UK Businesses: Broad / Detailed Product Groups 1999 to 2002
Table 7A	Employment in R&D Performed in Scottish Businesses: Detailed Product Groups, 2001 and 2002 (see note 3)
Table 8	Employment on Civil and Defence R&D Performed within Scottish and UK Businesses by job type 1994 – 2002
Table 9	Expenditure on Civil and Defence R&D Performed in Scottish and UK Businesses: Broad Product Groups 1999 – 2002 (see note 3)
Table 10	Current and Capital Expenditure on R&D Performed within Scottish and UK Businesses: 1994 – 2002
Table 10A	Current and Capital Expenditure on R&D Performed in Scottish Businesses: Broad Product Groups UK aggregated from detailed product groups), 2001 and 2002 (see note 3)
Table 11	Expenditure and Employment on R&D Performed in Scottish and UK Businesses: Top 100 Enterprise Groups 1999 – 2002 (see note 3)
Table 12	Expenditure on R&D Performed in Scottish and UK Businesses by Total Company Employment Sizebands 2000 – 2002 (see note 3)
Table 12A	R&D Employment in Scottish and UK Businesses by Total UK Company Employment Sizebands: Broad Product Groups 2001 and 2002
Table 13	Intramural Expenditure and Employment on R&D Performed in Scottish & UK Businesses by Country of Ownership of Business Performing R&D 1994 - 2002

Table 14	Expenditure on R&D Performed in Scottish and UK Businesses by Country of Ownership of Business Performing R&D: Broad Product Groups 1999 – 2002 (see note 3)
Table 14A	Number of Businesses Performing R&D in Scotland / in the UK by Country of Ownership of Business Performing R&D Broad Product Groups 2001 and 2002 (see note 3)
Table 15	Number of Businesses Performing R&D in Scotland and UK by Total UK Size-Bands: Broad Product Groups 1999 – 2002 (see note 3)
Table 16	R&D Intensity in Manufactured Products in Scottish and UK Businesses Selected Products 2000 – 2001 (only 2001 available on printed version – see note 3)
Table 17	Government Offices Regional Breakdown of R&D Performed within UK Businesses: By Location of Reporting Unit, 2001 and Enterprise 2002 (see note 3)
Table 18	Expenditure on R&D Performed in Scottish Businesses by Business age: Broad Product Groups (Scotland only) 2002
Table 19	Number of businesses Performing R&D in Scotland by Business Age: Broad Product Groups 2002
Table 20	Expenditure on R&D Performed in Scottish Businesses by Business Age: Location of Enterprise Address 2002
Table 21	Number of Businesses undertaking R&D in Scotland by Location of Enterprise Address 2002
Table 22	Expenditure of R&D performed in Scottish Businesses by SIC of Enterprise: Manufacturing and R&D Services 2002
Table 23	Expenditure on R&D Performed in Scottish Businesses: Unitary Authority Level 2000 – 2002

Notation used throughout the tables:

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Printed version of this report has only the latest version of this table. Earlier years' tables are available on the internet version or printed on request. Contact Author for further information.

Table 1
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS,
Current Prices

	£ Thousands								
Scotland	1994	1995	1996	1997	1998	1999	2000	2001	2002
Manufacturing: Total	244487	215351	233850	214076	254829	315498	359350	461847	551625
Chemicals	55138	28300	44333	36397	61429	134984	131767	161224	246824
Mechanical engineering	38067	38724	45421	45270	53641	55623	55989	52014	57373
Electrical machinery	111488	111811	116229	103521	115040	96062	136156	126459	141435
Transport equipment & aerospace	15832	10321	2421	2409	4455	3342	3543	3701	13165
Other manufactured products	23963	26195	25446	26480	20264	25488	31896	118450	92827
Services	12730	45489	60531	69891	90961	65157	33679	42545	69849
Other: Total	6012	7894	7324	6869	11724	12753	6829	7983	18599
Agriculture, hunting & forestry; Fishing	1089 ..	..	..	..	..	..	..	..	547
Extractive industries	1611	4226	2982	2879	6389	8688	4540	6271	15126
Electricity, gas & water supply	2805 ..	..	..	1023 ..	..	..	657 ..	..	..
Construction	507 ..	..	212 ..	..	..	..	..	..	..
GRAND TOTAL	263229	268734	301705	290835	357514	393408	399858	512376	640073

Source Table 1 ONS Scottish R&D Report

(continued on next page)

Table 1 (continued)
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS
Current Prices

	£ Thousands								
UK	1994	1995	1996	1997	1998	1999	2000	2001*	2002
Manufacturing: Total	7051000	7157000	7264000	7608000	8142000	8995000	9231000	9788000	10140000
Chemicals	2509000	2515000	2479000	2831000	2926000	3253000	3528000	3562000	3887000
Mechanical engineering	761000	683000	668000	709000	730000	712000	776000	907000	826000
Electrical machinery	1218000	1245000	1313000	1181000	1320000	1335000	1558000	1599000	1565000
Transport & Aerospace	1570000	1719000	1789000	1883000	2059000	2472000	2185000	2449000	2591000
Transport Equipment	710000	833000	977000	990000	1020000	1235000	1094000	1189000	1244000
Aerospace	860000	886000	812000	893000	1039000	1237000	1091000	1260000	1347000
Other manufacturing	993000	994000	1016000	1004000	1108000	1222000	1183000	1271000	1272000
Services	1458000 ..	..	1736000	1652000	1668000	1972000	1905000	2280000	2645000
Other: Total	334000 ..	..	296000	295000	323000	335000	374000	268000	324000
Agriculture, hunting & forestry, Fishing	80000 ..	..	76000	84000	102000	115000	135000	96000	122000
Extractive industries	66000	65000	64000	44000	41000	42000	46000	43000	52000
Electricity, gas & water supply	177000	168000	148000	130000	140000	137000	160000	99000	116000
Construction	11000	8000	8000	38000	39000	41000	34000	30000	35000
GRAND TOTAL	8842000	9116000	9297000	9556000	10133000	11302000	11510000	12336000	13110000

Source Table 1 of MA14

* Data for 2001 have been revised due to the availability of updated company information.

Table 1A Scotland

**EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 1994 TO 2002
IN REAL TERMS (2002 PRICES)**

	£ thousand									
Scotland	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Manufacturing: Total	301 330	257 908	270 719	241 700	279 651	338 732	380 881	477 056	551 625	
Chemicals	67 957	33 893	51 323	41 093	67 413	144 924	139 662	166 533	246 824	
Mechanical engineering	46 918	46 376	52 582	51 111	58 866	59 719	59 343	53 727	57 373	
Electrical machinery	137 409	133 907	134 554	116 879	126 245	103 136	144 314	130 623	141 435	
Transport equipment & aerospace	19 512	12 360	2 802	2 720	4 889	3 588	3 755	3 823	13 165	
Other manufactured products	29 534	31 372	29 458	29 896	22 238	27 365	33 807	122 351	92 827	
Services	15 689	54 479	70 075	78 910	99 821	69 956	35 697	43 946	69 849	
Other: Total	7 409	9 454	8 478	7 755	12 866	13 692	7 238	8 246	18 599	
Agriculture, hunting & forestry; Fishing	1 342	..	..	..	..	..	..	..	547	
Extractive industries	1 985	5 061	3 452	3 251	7 011	9 328	4 812	6 478	15 126	
Electricity, gas & water supply	3 457	..	..	1 155	..	..	696	..	..
Construction	625	..	246	..	..	..	..	..	..
TOTAL OF DATA PROVIDED	324 429	317 448	344 492	325 015	386 483	418 015	422 087	527 480	637 146	
TOTAL OF DISCLOSIVE DATA	-	4 393	4 780	3 349	5 855	4 364	1 729	1 768	2 927	
GRAND TOTAL	324 429	321 841	349 272	328 364	392 338	422 379	423 816	529 249	640 073	

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 1A of MA14

(Continued on next page)

Table 1A UK (Continued)

**EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS,
In Real Terms (2002 PRICES)**

	£ Thousands									
UK	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Manufacturing: Total	8,685,000	8,536,000	8,410,000	8,541,000	8,898,000	9,652,000	9,737,000	10,067,000	10,140,000	
Chemicals	3,090,000	3,000,000	2,870,000	3,178,000	3,198,000	3,490,000	3,721,000	3,664,000	3,887,000	
Mechanical engineering	937,000	815,000	773,000	796,000	798,000	764,000	819,000	933,000	826,000	
Electrical machinery	1,500,000	1,485,000	1,520,000	1,326,000	1,443,000	1,432,000	1,643,000	1,645,000	1,565,000	
Transport equipment & aerospace	1,934,000	2,051,000	2,071,000	2,114,000	2,250,000	2,652,000	2,305,000	2,519,000	2,591,000	
Transport Equipment	875,000	994,000	1,131,000	1,111,000	1,115,000	1,325,000	1,154,000	1,223,000	1,244,000	
Aerospace	1,059,000	1,057,000	940,000	1,003,000	1,135,000	1,327,000	1,151,000	1,296,000	1,347,000	
Other manufactured products	1,223,000	1,186,000	1,176,000	1,127,000	1,211,000	1,311,000	1,248,000	1,307,000	1,272,000	
Services	1,796,000	..	2,010,000	1,855,000	1,823,000	2,116,000	2,009,000	2,345,000	2,645,000	
Other: Total	411,000	..	343,000	331,000	353,000	359,000	395,000	276,000	324,000	
Agriculture, hunting & forestry; Fishing	99,000	..	88,000	94,000	111,000	123,000	142,000	99,000	122,000	
Extractive industries	81,000	78,000	74,000	49,000	45,000	45,000	49,000	44,000	52,000	
Electricity, gas & water supply	218,000	200,000	171,000	146,000	153,000	147,000	169,000	102,000	116,000	
Construction	14,000	10,000	9,000	43,000	43,000	44,000	36,000	31,000	35,000	
GRAND TOTAL	10,891,000	10,873,000	10,764,000	10,728,000	11,073,000	12,127,000	12,141,000	12,688,000	13,110,000	

Source Table 1A MA14

GDP deflator used to convert cash terms to
real terms (2002=100)

81.2	83.8	86.4	89.1	91.5	93.2	94.8	97.2	100
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Table 2:
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
DETAILED PRODUCT GROUPS, 1994 to 2002

	£ Thousand								
Scotland	1994	1995	1996	1997	1998	1999	2000	2001	2002
Agriculture, hunting and forestry: Fishing	1 089	..	..	..	..	..	..	..	547
Extractive Industries	1 611	4 226	2 982	2 879	6 389	8 688	4 540	6 271	15 126
Food Products and beverages: Tobacco products	6 507	3 071	2 143	3 167	2 268	1 871	2 937	8 668	6 147
Textiles, clothing and leather products	1 498	1 625	1 356	1 934	2 594	2 150	2 022	898	1 357
Pulp, paper and paper products: Printing and publishing: Wood and straw products	1 649	1 957	4 100	1 275	933	848	541	..	775
Refined petroleum products and coke oven products: Processing of nuclear fuel	60	..	..	..	..	..	..	..	..
Chemicals, Man-made fibres	12 449	16 693	19 989	14 481	21 107	21 810	16 110	27 610	30 146
Pharmaceuticals, medical chemicals and botanical products	42 689	11 607	24 345	21 916	40 322	113 174	115 657	133 613	216 678
Rubber and plastic products	3 349	2 936	1 423	..	..	1 381	2 396	1 050	2 304
Other non-metallic mineral products	708	370	..	..	..	..	372	..	..
Casting of iron and steel	..	..	..	..	..	..	..	..	594
Non-ferrous metals	..	..	..	..	..	..	..	..	..
Fabricated metal products	750	4 070	5 745	6 197	8 288	8 494	5 666	4 996	5 296
Machinery and equipment	37 317	34 654	39 676	39 072	45 354	47 129	50 323	47 018	52 078
Office machinery and computers	..	..	..	..	..	10 523	5 465	6 446	5 237
Electrical machinery and apparatus	..	..	..	..	..	70 370	115 281	103 148	26 958
Radio, television and communication equipment	4 056	3 538	4 867	11 817	10 656	15 168	15 411	16 864	109 240
Precision instruments	9 064	14 509	14 425	17 037	10 466	16 289	22 419	105 924	78 171
Motor vehicles and parts	4 810	..	811	1 408	3 372	2 385	1 930	2 397	2 222
Other transport equipment	..	..	..	..	..	..	..	..	..
Shipbuilding and repairs	..	..	..	..	..	..	..	..	..
Aerospace	..	..	..	..	..	..	..	..	1 664
Transport Equipment & Aerospace total ¹	15832	10321	2421	2409	4455	3342	3543	3701	13165
Other Transport Equipment & Aerospace(excludes Motor Vehicles and parts)	11 022	..	1 610	1 001	1 083	957	1 613	1 304	10 943
Furniture: Other manufactured goods	344	354	371	..	..	1 799	..	909	2 924
Recycling	533	..	..	..	..	..	800	..	..
Electricity, gas and water supply	2 805	..	..	1 023	..	..	657	..	..
Construction	507	..	212	..	..	..	..	..	..
Wholesale and retail trade	168	4 483	63	..	..	..	..	1 500	3 028
Transport and storage	18	..	..	..	..	..	..	..	..
Post and telecommunications	..	..	..	..	..	..	..	..	..
Miscellaneous business activities: Technical testing and analysis	188	9 139	9 115	5 310	3 544	4 539	8 101	7 563	14 653
Computer and related activities	3 314	26 455	37 960	55 048	57 705	40 961	9 797	10 158	18 022
Research and development services	8 720	5 374	13 124	..	29 658	19 551	13 130	16 960	26 321
Public administration	..	38	..	..	..	..	..	..	1 151
Total Manufacturing 4	244 487	215 351	233 850	214 076	254 829	315 498	359 350	461 847	551 625
Total Services²	12 730	45 489	60 531	69 891	90 961	65 157	33 679	42 545	69 849
GRAND TOTAL³	263 229	268 734	301 705	290 835	357 514	393 408	399 858	512 376	640 073

Source Table 2 ONS Scottish R&D Report

(Continued on next page)

Table 2: (Continued)
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
DETAILED PRODUCT GROUPS, 1994 TO 2001

	£ Thousands									
UK	1994	1995	1996	1997	1998	1999	2000	2001	2002	
Agriculture, hunting and forestry: Fishing	80,000	..	76,000	84,000	102,000	115,000	135,000	96,000	122,000	
Extractive Industries	66,000	..	64,000	44,000	41,000	42,000	46,000	43,000	52,000	
Food Products and beverages: Tobacco products	228,000	189,000	198,000	180,000	242,000	237,000	264,000	314,000	299,000	
Textiles, clothing and leather products	22,000	23,000	27,000	33,000	33,000	28,000	29,000	17,000	19,000	
Pulp, paper and paper products: Printing and publishing: Wood and straw products	44,000	39,000	57,000	44,000	49,000	45,000	38,000	34,000	44,000	
Refined petroleum products and coke oven products: Processing of nuclear fuel	203,000	239,000	230,000	225,000	234,000	212,000	182,000	250,000	258,000	
Chemicals, Man-made fibres	689,000	701,000	627,000	680,000	688,000	718,000	682,000	522,000	583,000	
Pharmaceuticals, medical chemicals and botanical products	1,820,000	1,813,000	1,852,000	2,151,000	2,258,000	2,555,000	2,846,000	3,040,000	3,304,000	
Rubber and plastic products	72,000	60,000	67,000	60,000	66,000	72,000	54,000	45,000	64,000	
Other non-metallic mineral products	56,000	54,000	60,000	47,000	56,000	59,000	..	41,000	46,000	
Casting of iron and steel	51,000	46,000	39,000	39,000	47,000	41,000	..	31,000	32,000	
Non-ferrous metals	15,000	20,000	15,000	15,000	20,000	22,000	21,000	19,000	16,000	
Fabricated metal products	72,000	100,000	91,000	88,000	90,000	70,000	73,000	64,000	59,000	
Machinery and equipment	689,000	583,000	577,000	622,000	640,000	642,000	703,000	843,000	767,000	
Office machinery and computers	134,000	150,000	161,000	102,000	125,000	111,000	113,000	105,000	146,000	
Electrical machinery and apparatus	567,000	494,000	490,000	424,000	423,000	357,000	422,000	451,000	462,000	
Radio, television and communication equipment	517,000	602,000	662,000	655,000	772,000	867,000	1,024,000	1,044,000	957,000	
Precision instruments	273,000	303,000	307,000	336,000	340,000	473,000	480,000	488,000	442,000	
Motor vehicles and parts	669,000	795,000	926,000	924,000	913,000	1,060,000	864,000	898,000	929,000	
Other transport equipment	24,000	18,000	30,000	50,000	72,000	99,000	158,000	208,000	..	
Shipbuilding and repairs	17,000	20,000	20,000	15,000	36,000	76,000	72,000	83,000	..	
Aerospace	860,000	886,000	812,000	893,000	1,039,000	1,237,000	1,091,000	1,260,000	1,347,000	
Transport Equipment and Aerospace total ¹	1,570,000	1,719,000	1,789,000	1,883,000	2,059,000	2,472,000	2,185,000	2,449,000	2,591,000	
Other Transport Equipment & Aerospace(excludes Motor Vehicles and parts)	901,000	924,000	863,000	959,000	1,146,000	1,412,000	1,321,000	1,551,000	1,662,000	
Furniture: Other manufactured goods	28,000	21,000	16,000	25,000	20,000	..	33,000	31,000	48,000	
Recycling	1,000	..	1,000	..	..	1,000	1,000	1,000	3,000
Electricity, gas and water supply	177,000	168,000	148,000	130,000	140,000	137,000	160,000	99,000	116,000	
Construction	11,000	8,000	8,000	38,000	39,000	41,000	34,000	30,000	35,000	
Wholesale and retail trade	..	..	..	..	..	..	..	55,000	69,000
Transport and storage	..	..	..	..	..	..	..	12,000	10,000
Post and telecommunications	408,000	414,000	455,000	496,000	449,000	565,000	674,000	733,000	742,000	
Miscellaneous business activities: Technical testing and analysis	104,000	..	141,000	142,000	157,000	196,000	131,000	242,000	360,000	
Computer and related activities	744,000	675,000	749,000	680,000	688,000	713,000	611,000	725,000	888,000	
Research and development services	178,000	247,000	369,000	313,000	346,000	448,000	428,000	495,000	558,000	
Public administration	10,000	14,000	10,000	6,000	8,000	11,000	12,000	18,000	18,000	
Total Manufacturing 4	7,051,000	7,157,000	7,264,000	7,608,000	8,142,000	8,995,000	9,231,000	9,788,000	10,140,000	
Total Services²	1,458,000	-	1,736,000	1,652,000	1,668,000	1,972,000	1,905,000	2,280,000	2,645,000	
GRAND TOTAL³	8,842,000	9,116,000	9,297,000	9,556,000	10,133,000	11,302,000	11,510,000	12,336,000	13,110,000	

Source: Table 2 MA14

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3. Figures taken from Table 1 as detailed level is disclosive. These are then used to calculate "Other transport Equipment and Aerospace" by subtracting Motor Vehicles and parts from the total.

4. Excludes public sector

Table 3:
Scotland
CURRENT EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS,

	2002		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	514 806	176 070	34%
Chemicals	228 278	42 281	19%
Mechanical engineering	56 394	46 362	82%
Electrical machinery	135 159	67 981	50%
Transport equipment & aerospace	11 887	9 577	81%
Other manufactured products	83 088	9 869	12%
Services	63 700	20 770	33%
Other: Total	17 873	6 260	35%
Agriculture, hunting & forestry; Fishing	428	97	23%
Extractive industries	14 671	5 241	36%
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	596 379	203 100	34%

Source Table 3 ONS Scottish R&D Report

Table 3:
UK
CURRENT EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS,

	2002		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	8,871,000	4,781,000	54%
Chemicals	3,334,000	1,644,000	49%
Mechanical engineering	789,000	405,000	51%
Electrical machinery	1,493,000	891,000	60%
Transport equipment & aerospace	2,151,000	1,425,000	66%
Other manufactured products	1,104,000	416,000	38%
Services	2,468,000	1,327,000	54%
Other: Total	287,000	102,000	36%
Agriculture, hunting & forestry; Fishing	95,000	22,000	23%
Extractive industries	49,000	21,000	43%
Electricity, gas & water supply	110,000	59,000	54%
Construction	33,000	..	..
GRAND TOTAL	11,943,000	6,211,000	52%

Source Table 5 MA14

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the detailed product groups in table 5 of MA14

Table 3:
Scotland
CURRENT EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS,

	2001		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	408 589	112 669	28%
Chemicals	146 673	19 613	13%
Mechanical engineering	51 220	8 362	16%
Electrical machinery	102 216	25 175	25%
Transport equipment & aerospace	3 521	2 818	80%
Other manufactured products	104 958	56 701	54%
Services	38 542	17 411	45%
Other: Total	7 631	3 131	41%
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	6 056	2 990	49%
Electricity, gas & water supply	..	..	..
Construction	..	1	..
GRAND TOTAL	454 762	133 211	29%

Table 3:
UK
CURRENT EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS,

	2001		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	8,400,000	5,021,000	60%
Chemicals	3,010,000	1,529,000	51%
Mechanical engineering	818,000	583,000	71%
Electrical machinery	1,434,000	888,000	62%
Transport equipment & aerospace	2,045,000	1,500,000	73%
Other manufactured products	1,093,000	521,000	48%
Services	2,070,000	1,317,000	64%
Other: Total	242,000	91,000	38%
Agriculture, hunting & forestry; Fishing	79,000	16,000	20%
Extractive industries	38,000	19,000	50%
Electricity, gas & water supply	97,000	56,000	58%
Construction	28,000	0	0%
GRAND TOTAL	11,001,000	6,667,000	61%

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the detailed product groups in table 5 of MA14

Table 3:
Scotland
CURRENT EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS

	2000		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	310,659	142,382	45.8
Chemicals	112,705	72,504	64.3
Mechanical engineering	55,220	9,728	17.6
Electrical machinery	109,493	39,976	36.5
Transport equipment & aerospace	3,257	2,441	74.9
Other manufactured products	29,983	17,734	59.1
Services	31,741	10,211	32.2
Other: Total	6,495	2,829	43.6
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	4,384	2,427	55.4
Electricity, gas & water supply	628	253	40.3
Construction	..	..	..
GRAND TOTAL	348,895	155,421	44.5

Table 3:
UK
CURRENT EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2000

	2000		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	7,944,000	5,083,000	64
Chemicals	2,921,000	1,685,000	58
Mechanical engineering	746,000	495,000	66
Electrical machinery	1,364,000	827,000	61
Transport equipment & aerospace	2,060,000	1,622,000	79
Other manufactured products	853,000	454,000	53
Services	1,761,000	967,000	55
Other: Total	340,000	82,000	24
Agriculture, hunting & forestry; Fishing	111,000	..	..
Extractive industries	44,000	21,000	48
Electricity, gas & water supply	153,000	61,000	40
Construction	32,000	..	..
GRAND TOTAL	10,331,000	6,291,000	61

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the detailed product groups in table 5 of MA14

Table 3:
Scotland
CURRENT EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS

	1999		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	282,166	166,850	59
Chemicals	113,070	66,788	59
Mechanical engineering	52,273	6,886	13
Electrical machinery	90,050	76,165	85
Transport equipment & aerospace	3,085	2,401	78
Other manufactured products	23,689	14,609	62
Services	61,033	23,768	39
Other: Total	12,309	3,071	25
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	8,620	1,832	21
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	355,508	193,689	54

Table 3:
UK
CURRENT EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 1999

	1999		
	Total current (£ Thousand)	Experimental Development (£ Thousands)	% of total experimental
Manufacturing: Total	7,919,000	4,629,000	58
Chemicals	2,695,000	1,296,000	48
Mechanical engineering	683,000	388,000	57
Electrical machinery	1,201,000	657,000	55
Transport equipment & aerospace	2,242,000	1,809,000	81
Other manufactured products	1,098,000	479,000	44
Services	1,852,000	892,000	48
Other: Total	304,000	124,000	41
Agriculture, hunting & forestry; Fishing	99,000	47,000	47
Extractive industries	41,000	20,000	49
Electricity, gas & water supply	124,000	56,000	45
Construction	40,000	1,000	3
GRAND TOTAL	10,077,000	5,646,000	56

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the detailed product groups in table 5 of MA14

Table 4

**EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

Scotland	2002		
	Total	Source	
		United Kingdom	Overseas
	£Thousands		
Manufacturing: Total	41 820	24 723	17 097
Chemicals	21 573	11 807	9 766
Mechanical engineering	793	728	65
Electrical machinery	..	..	673
Transport equipment & aerospace	..	..	131
Other manufactured products	11 632	5 169	6 463
Services	6 540	4 933	..
Other: Total	2 810	783	..
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	2 596	576	..
Electricity, gas & water supply	-	-	-
Construction	..	..	-
GRAND TOTAL	51 170	30 439	20 731

Source Table 4 ONS Scottish R&D Report

Table 4

**EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

UK	2002		
	Total	Place performed	
		United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	2,262,000	976,000	1,079,000
Chemicals	1,325,000	507,000	817,000
Mechanical engineering	31,000	30,000	1,000
Electrical machinery	215,000	8,000	2,000
Transport equipment & aerospace	541,000	329,000	211,000
Other manufactured products	150,000	102,000	48,000
Services	238,000	135,000	103,000
Other: Total	64,000	45,000	19,000
Agriculture, hunting & forestry; Fishing	21,000	12,000	9,000
Extractive industries	12,000	4,000	8,000
Electricity, gas & water supply	24,000	22,000	2,000
Construction	7,000	7,000	-
GRAND TOTAL	2,562,000	1,294,000	1,267,000

Source: Table 6 MA14

1. Prior to 2001 data are calculated from the detailed level expenditure from the MA14 publication.
2. From 2001 onwards the data come from special analysis by ONS and include disclosive data

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2001

Scotland	2001		
	Source		
	Total	United Kingdom	Overseas
	£Thousands		
Manufacturing: Total	11,499	7,525	3,974
Chemicals	5,669	3,168	2,501
Mechanical engineering	2,427	1,361	1,067
Electrical machinery	..	..	..
Transport equipment & aerospace	..	..	..
Other manufactured products	927	685	242
Services	7003	6082	921
Other: Total	6,779	5,598	1,181
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	6,616	5,436	1,179
Electricity, gas & water supply	-	-	-
Construction	..	..	..
GRAND TOTAL	25,282	19,205	6,077

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2001

UK	2001 ²		
	Place performed		
	Total	United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	1,773,000	.. ..
Chemicals	1,095,000	515,000	580000
Mechanical engineering	34,000	23,000	11000
Electrical machinery	117,000	.. ..
Transport equipment & aerospace	432,000	265,000	167000
Other manufactured products	94,000	.. ..
Services	191,000	158,000	33000
Other: Total	58,000	.. ..
Agriculture, hunting & forestry; Fishing	21,000	.. ..
Extractive industries	11,000	9,000	2000
Electricity, gas & water supply	22,000	21,000	2000
Construction	3,000	3,000	0
GRAND TOTAL	2,021,000	1,169,000	852000

1. Prior to 2001 data are calculated from the detailed level expenditure from the MA14 publication.
2. From 2001 onwards the data come from special analysis by ONS and include disclosive data

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2000

Scotland	2000		
	Total	Source	
		United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	18,254	8,234	10,020
Chemicals	4,438	2,410	2,028
Mechanical engineering	1,288	1,267	21
Electrical machinery	8,917	1,681	7,235
Transport equipment & aerospace	868	530	337
Other manufactured products	2,743	2,345	398
Services	2,323	..	..
Other: Total	12,438	..	..
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	..	..	..
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	33,015	16,619	16,395

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2000

UK	2000 ¹		
	Total	Place performed	
		United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	1,370,000	712,000	518,000
Chemicals	763,000	341,000	366,000
Mechanical engineering	32,000	26,000	2,000
Electrical machinery	104,000	60,000	5,000
Transport equipment & aerospace	376,000	236,000	121,000
Other manufactured products	95,000	49,000	24,000
Services	110,000	102,000	8,000
Other: Total	61,000	58,000	3,000
Agriculture, hunting & forestry; Fishing	..	12,000	..
Extractive industries	..	10,000	..
Electricity, gas & water supply	34,000	31,000	3,000
Construction	5,000	5,000	..
GRAND TOTAL	1,665,000	946,000	719,000

1. Prior to 2001 data are calculated from the detailed level expenditure from the MA14 publication.
2. From 2001 onwards the data come from special analysis by ONS and include disclosive data

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 1999

Scotland	1999		
	Total	Source	
		United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	27,980	16,186	11,794
Chemicals	13,720	5,382	8,338
Mechanical engineering	1,026	923	104
Electrical machinery	10,478	7,799	2,680
Transport equipment & aerospace	..	..	..
Other manufactured products	..	..	..
Services	14,791	12,402	2,390
Other: Total	2,926	1,832	1,094
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	..	..	..
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	45,698	30,420	15,277

Table 4
EXTRAMURAL EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 1999

UK	1999 ¹		
	Total	Place performed	
		United Kingdom	Overseas
	£ Thousands		
Manufacturing: Total	1,446,000	844,000	555,000
Chemicals	755,000	355,000	399,000
Mechanical engineering	44,000	41,000	4,000
Electrical machinery	179,000	133,000	46,000
Transport equipment & aerospace	297,000	206,000	91,000
Other manufactured products	81,000	72,000	8,000
Services	231,000	180,000	51,000
Other: Total	94,000	54,000	40,000
Agriculture, hunting & forestry; Fishing	45,000	11,000	33,000
Extractive industries	9,000	5,000	4,000
Electricity, gas & water supply	36,000	32,000	3,000
Construction	6,000	6,000	..
GRAND TOTAL	1,802,000	1,125,000	678,000

1. Prior to 2001 data are calculated from the detailed level expenditure from the MA14 publication.
2. From 2001 onwards the data come from special analysis by ONS and include disclosive data

Table 5:
SOURCES OF FUNDS FOR R&D PERFORMED WITHIN SCOTTISH BUSINESSES:
1994 TO 2002

£ Thousands

Scotland	1994	1995	1996	1997	1998	1999	2000	2001*	2002
TOTAL	263,229	268,734	301,705	290,835	357,514	393,408	399,858	512 376	640 073
UK Government	51,311	70,979	65,585	58,427	77,992	58,105	60,520	65 340	17 580
Overseas total of which:	70,705	55,426	72,264	71,231	79,008	69,437	50,514	81 205	94 324
European Commission grants	..	1,152	4,292	3,452	5,445	4,596	4,966	4 938	6 163
Other Overseas	..	54,274	67,972	67,779	73,564	64,841	45,548	76 267	88 161
Other UK Business	8,541	16,140	22,797	..	33,697	85,566	87,781	103 661	141 963
Own funds	132,484	126,158	140,302	133,412	166,816	180,290	201,040	261 969	386 079
Other	188	31	757	..	1	9	4	high, now 202	127
GRAND TOTAL	263,229	268,734	301,705	290,835	357,514	393,408	399,858	512 376	640 073
									Percent
percentages	1994	1995	1996	1997	1998	1999	2000	2001	2002
TOTAL	100	100	100	100	100	100	100	100	100
UK Government	19	26	22	20	22	15	15	13	3
Overseas total of which:	27	21	24	24	22	18	13	16	15
European Commission grants	..	-	1	1	2	1	1	1	1
Other Overseas	..	20	23	23	21	16	11	15	14
Other UK Business	3	6	8	..	9	22	22	20	22
Own funds	50	47	47	46	47	46	50	51	60
Other	-	-	-	..	-	-	-	-	-

Source Table 5 ONS Scottish R&D Report

(Continued on next page)

NB percentages keyed in from published data, not calculated here.

Table 5: (Continued)
SOURCES OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES:
1994 TO 2000

£ Thousands

UK	1994	1995	1996	1997	1998	1999	2000	2001*	2002
UK Government	910,000	953,000	842,000	915,000	1,094,000	1,157,000	1,013,000	1101000*	884,000
Overseas total of which:	1,410,000	1,738,000	2,018,000	1,800,000	2,238,000	2,570,000	2,470,000	3012000*	3,567,000
European Commission grants	63,000	93,000	131,000	108,000	119,000	137,000	101,000	109000*	177,000
Other Overseas	1,347,000	1,645,000	1,887,000	1,692,000	2,119,000	2,433,000	2,369,000	2903000*	33,691,000
Other UK Business	474,000	700,000	691,000	642,000	659,000	750,000	779,000	764000*	942,000
Own funds	6,030,000	5,723,000	5,742,000	6,198,000	6,141,000	6,824,000	7,244,000	7455000*	7,712,000
Other	19,000	3,000	5,000	1,000	-	1,000	3,000	4,000	4,000
GRAND TOTAL	8,842,000	9,116,000	9,297,000	9,556,000	10,133,000	11,302,000	11,510,000	12336000*	13,110,000
									Percent
percentages	1994	1995	1996	1997	1998	1999	2000	2,001	2002
TOTAL	100	100	100	100	100	100	100	100	100
UK Government	10	10	9	10	11	10	9	9	7
Overseas total of which:	16	19	22	19	22	23	21	24	27
European Commission grants	1	1	1	1	1	1	1	1	1
Other Overseas	15	18	20	18	21	22	21	24	26
Other UK Business	5	8	7	7	7	7	7	6	7
Own funds	68	63	62	65	61	60	63	60	59
Other	-	-	-	-	-	-	-	-	-

Source: Table 7 MA14

* denotes data for 2001 which have been revised due to the availability of updated company information.

NB percentages keyed in from published data, not calculated here.

TABLE 5A
SOURCE OF FUNDS FOR R&D PERFORMED WITHIN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2002

£Thousand

Scotland	2002				
	Total Expenditure	UK Government	Overseas	Own Funds	Other UK Business
Manufacturing: Total	551,625	15,843	70,920	333,381	131,481
Chemicals	246,824	..	21,426	103,921	..
Mechanical engineering	57,373	2,622	2,033	52,243	476
Electrical machinery	141,435	5,586	39,887	87,324	8,638
Transport equipment & aerospace	13,165	..	566	6,079	..
Other manufactured products	92,827	473	7,008	83,815	1,532
Services	69,849	786	18,204	41,008	9,851
Other: Total	18,599	951	5,200	11,690	758
Agriculture, hunting & forestry; Fishing	547	131	15	381	19
Extractive industries	15,126	11	5,014	9,942	158
Electricity, gas & water supply	..	..	..	..	..
Construction	..	..	..	..	..
GRAND TOTAL	640,073	17,580	94,324	386,079	142,090

Source ONS special analysis

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Transport equipment and Aerospace have been combined to prevent disclosive data
- 4 Figures for other UK Business includes funds from other sources and Higher Education Establishments
- 5 This data is provided for the whole of the UK in table 8 of MA14

TABLE 5A
SOURCE OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES:
BROAD PRODUCT GROUPS 2002

£ Thousand

UK	2002				
	Total Expenditure	UK Government	Overseas	Own Funds	Other UK Business
Manufacturing: Total	10,140,000	729,000	2,869,000	5,877,000	666,000
Chemicals	3,887,000	5,000	1,501,000	2,124,000	256,000
Mechanical engineering	826,000	296,000	100,000	403,000	28,000
Electrical machinery	1,565,000	189,000	371,000	887,000	117,000
Transport equipment	1,244,000	103,000	174,000	921,000	46,000
Aerospace	1,347,000	122,000	512,000	629,000	85,000
Other manufactured products	1,272,000	14,000	211,000	913,000	133,000
Services	2,645,000	100,000	658,000	1,642,000	245,000
Other: Total	324,000	55,000	40,000	193,000	35,000
Agriculture, hunting & forestry; Fishing	122,000	..	3,000	85,000	..
Extractive industries	52,000	0	27,000	21,000	3,000
Electricity, gas & water supply	116,000	1,000	7,000	87,000	20,000
Construction	35,000	..	2,000	0	..
GRAND TOTAL	13,110,000	884,000	3,567,000	7,712,000	946,000

Source ONS special analysis

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Figures for other UK Business includes funds from other sources and Higher Education Establishments
- 4 This data is provided for detailed product groups in table 8 of MA14

TABLE 5A
SOURCE OF FUNDS FOR R&D PERFORMED WITHIN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2001

	2001				
	Total Expenditure	UK Government	Overseas	Own Funds	Other UK Business
Manufacturing: Total	461,847	61,088	63,981	239,204	97,573
Chemicals	161,224	..	..	40,875	85,993
Mechanical engineering	52,014	1,318	2,659	47,806	231
Electrical machinery	126,459	55,853	9,151	60,158	1,296
Transport equipment & aerospace	3,701	..	..	3,176	88
Other manufactured products	118,450	3,779	17,517	87,189	9,966
Services	42,545	3,275	12,842	20,818	5,612
Other: Total	7,983	977	4,382	1,947	678
Agriculture, hunting & forestry; Fishing	..	..	..	..	..
Extractive industries	6,271	5	4,311	1,593	363
Electricity, gas & water supply	..	..	..	..	..
Construction	..	..	..	8	..
GRAND TOTAL	512,376	65,340	81,205	261,969	103,862

Source ONS special analysis

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Transport equipment and Aerospace have been combined to prevent disclosive data
- 4 Figures for other UK Business includes funds from other sources and Higher Education Establishments
- 5 This data is provided for the whole of the UK in table 8 of MA14

TABLE 5A
SOURCE OF FUNDS FOR R&D PERFORMED WITHIN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2001

	2001				
	Total Expenditure	UK Government	Overseas	Own Funds	Other UK Business
Manufacturing: Total	9,788,000	870,000	2,433,000	5,915,000	571,000
Chemicals	3,562,000	3,000	1,286,000	2,043,000	230,000
Mechanical engineering	907,000	330,000	95,000	468,000	14,000
Electrical machinery	1,599,000	233,000	333,000	955,000	78,000
Transport equipment	1,189,000	72,000	146,000	937,000	34,000
Aerospace	1,260,000	152,000	341,000	692,000	75,000
Other manufactured products	1,271,000	80,000	232,000	820,000	139,000
Services	2,280,000	187,000	545,000	1,383,000	164,000
Other: Total	268,000	44,000	35,000	157,000	32,000
Agriculture, hunting & forestry; Fishing	96,000	..	..	69,000	..
Extractive industries	43,000	0	26,000	13,000	4,000
Electricity, gas & water supply	99,000	..	..	75,000	..
Construction	30,000	22,000	1,000	0	7,000
GRAND TOTAL	12,336,000	1,101,000	3,012,000	7,455,000	768,000

Source ONS special analysis

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Figures for other UK Business includes funds from other sources and Higher Education Establishments
- 4 This data is provided for detailed product groups in table 8 of MA14

Table 6:
EMPLOYMENT ON R&D PERFORMED WITHIN SCOTTISH BUSINESSES:
1994 to 2002

Scotland job type	Full time equivalent								
	1994	1995	1996	1997	1998	1999	2000	2001*	2002
TOTAL	5,026	5,408	6,329	5,682	6,359	6,703	6,032	7,605	10,808
Scientist and engineers	2,875	3,506	4,233	3,866	4,574	3,922	3,435	4,454	6641
Technicians, laboratory assistants and draughtmen	1,205	990	1,115	956	1,005	1,069	1,117	1,271	1456
Administrative, clerical industrial and other staff	946	912	981	860	779	1,712	1,480	1,880	2711
As % of total employment									
Scientist and engineers	57	65	67	68	72	59	57	59	61
Technicians, laboratory assistants and draughtmen	24	18	18	17	16	16	19	17	13
Administrative, clerical industrial and other staff	19	17	16	15	12	26	25	25	25

Source Table 6 ONS Scottish R&D Report

* 2001 data have been amended as a result of new information becoming available to ONS

Table 6:
EMPLOYMENT ON R&D PERFORMED WITHIN UK BUSINESSES:
1994 to 2002

UK Job type	Full time equivalent								
	1994	1995	1996	1997	1998	1999	2000	2001*	2002
TOTAL	150,000	145,000	142,000	137,000	148,000	153,000	145,000	152,000	167,000
Scientist and engineers	79,000	82,000	82,000	83,000	91,000	92,000	86,000	93,000	105,000
Technicians, laboratory assistants and draughtmen	40,000	33,000	33,000	30,000	32,000	33,000	30,000	28,000	30,000
Administrative, clerical industrial and other staff	31,000	29,000	27,000	24,000	24,000	28,000	30,000	31,000	32,000
As % of total employment									
Scientist and engineers	53	57	58	61	61	60	59	61	63
Technicians, laboratory assistants and draughtmen	27	23	23	22	22	22	21	18	18
Administrative, clerical industrial and other staff	21	20	19	18	16	18	21	20	19

Source: Table 9 MA14

* 2001 data have been amended as a result of new information becoming available to ONS

Table 7:

**EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2002**
**Employment
Full time equivalent**

Scotland	2002			
	R&D employment	Scientists and Engineers	laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	9215	5621	1190	2404
Chemicals - Of Which:	3591	1210	608	1773
<i>Chemicals. Man-made fibres</i>	478	205	224	49
<i>Pharmaceuticals</i>	3 114	1 005	384	1 725
Mechanical engineering	805	600	67	138
Electrical machinery	3293	2765	240	288
Transport equipment and Aerospace	256	169	59	28
Other manufactured products	1269	877	216	176
Services	1394	862	256	276
Other: Total	199	158	10	32
Agriculture, hunting & forestry; Fishing	15	8	3	3
Extractive industries	136	111	4	20
Electricity, gas & water supply	..	..	..	..
Construction	..	..	..	..
GRAND TOTAL	10808	6641	1456	2711

Source: ONS special analysis

Table 7

**EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

UK	2002 ⁶			
	R&D employment	Scientists and Engineers	laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	124 256	77 147	23 877	23 232
Chemicals	37 573	17 987	9 264	10 321
Mechanical engineering	15 575	11 899	1 781	1 895
Electrical machinery	24 016	18 182	3 012	2 822
Transport equipment and Aerospace	28 647	17 772	5 573	5 302
Other manufactured products	18 446	11 306	4 248	2 892
Services	38 621	24 738	6 064	7 818
Other: Total	4 048	2 736	536	775
Agriculture, hunting & forestry; Fishing	1 625	854	383	387
Extractive industries	461	370	26	65
Electricity, gas & water supply	1 320	941	127	252
Construction	642	570	-	71
GRAND TOTAL	166 924	104 621	30 477	31 826

Source: combination of MA14 table 10 and ONS special analysis

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 10 of MA14

5 1999 and 2000 calculated from detailed product group from Table 10 MA14

6 2001 onwards are provided by ONS as a special analysis at broad sector level. This prevents the omission of data which would be disclosive at detailed level.

Table 7:
EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2001

Employment
Full time equivalent

Scotland	2001			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	6,380	3,735	1,083	1,563
Chemicals - Of Which:	2,469	754	584	1,131
<i>Chemicals. Man-made fibres</i>	423	185	210	27
<i>Pharmaceuticals</i>	2,047	569	373	1,105
Mechanical engineering	747	614	73	60
Electrical machinery	1,761	1,347	236	177
Transport equipment and Aerospace	83	61	11	11
Other manufactured products	1,320	958	179	183
Services	1,129	641	182	306
Other: Total	96	79	6	10
Agriculture, hunting & forestry; Fishing	..	..	..	..
Extractive industries	55	48	3	4
Electricity, gas & water supply	..	..	..	..
Construction	25	22	-	3
GRAND TOTAL	7,605	4,454	1,271	1,880

Table 7
EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2001

UK	2001 ⁶			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	112 339	69 172	21 588	21 578
Chemicals	34 734	17 327	8 144	9 263
Mechanical engineering	11 806	9 186	1 232	1 388
Electrical machinery	20 572	15 929	2 721	1 921
Transport equipment & aerospace	26 800	15 091	5 624	6 086
Other manufactured products	18 427	11 638	3 868	2 921
Services	36 023	21 508	5 972	8 543
Other: Total	3 767	2 641	417	709
Agriculture, hunting & forestry; Fishing	..	..	239	296
Extractive industries	..	..	30	43
Electricity, gas & water supply	1 577	1 116	148	313
Construction	545	488	-	57
GRAND TOTAL	152 128	93 320	27 977	30 831

1 - denotes nil, figures unavailable or too small to display

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3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 10 of MA14

5 1999 and 2000 calculated from detailed product group from Table 10 MA14

6 2001 onwards are provided by ONS as a special analysis at broad sector level. This prevents the omission of data which would be

Table 7:
EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2000

Employment
Full time equivalent

Scotland	2000			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	5,108	2,810	987	1,311
Chemicals - Of Which:	1,856	520	463	874
<i>Chemicals. Man-made fibres</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>als, medical chemicals and botanical products</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Mechanical engineering	728	572	84	72
Electrical machinery	1,750	1,224	297	229
Transport equipment and Aerospace	109	64	21	24
Other manufactured products	665	430	122	112
Services	808	530	123	155
Other: Total	117	95	8	14
Agriculture, hunting & forestry; Fishing	-	-	-	-
Extractive industries	68	58	-	-
Electricity, gas & water supply	..	..	-	..
Construction	..	..	-	..
GRAND TOTAL	6,032	3,435	1,117	1,480

Source Table 7 ONS Scottish R&D Report

Table 7
EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2000

UK	2000 ³			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	111,576	64,315	24,094	23,167
Chemicals	35,786	16,859	8,781	10,146
Mechanical engineering	10,493	7,441	1,523	1,530
Services	28,943	18,015	4,918	6,010
Other: Total	4,980	3,407	669	904
Agriculture, hunting & forestry; Fishing	1,914	1,104	432	378
Extractive industries	405	346	24	35
Electricity, gas & water supply	2,030	1,387	211	433
Construction	631	570	2	59
GRAND TOTAL	145,499	85,737	29,681	30,081

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 10 of MA14

5 1999 and 2000 calculated from detailed product group from Table 10 MA14

6 2001 onwards are provided by ONS as a special analysis at broad sector level. This prevents the omission of data which would be disclosive at detailed level.

**Table 7:
EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 1999**

**Employment
Full time equivalent**

Scotland	1999			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	5,176	2,838	861	1,477
Chemicals - Of Which:	2,222	680	402	1,141
<i>Chemicals. Man-made fibres</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
<i>als, medical chemicals and botanical products</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>	<i>n/a</i>
Mechanical engineering	724	593	84	47
Electrical machinery	1,505	1,101	227	177
Transport equipment and Aerospace	78	51	12	15
Other manufactured products	648	413	136	98
Services	1,396	995	184	216
Other: Total	131	89	24	18
Agriculture, hunting & forestry; Fishing	35	15	10	10
Extractive industries	66	48	14	-
Electricity, gas & water supply	..	..	..	..
Construction	..	..	..	..
GRAND TOTAL	6,703	3,922	1,069	1,712

**Table 7
EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 1999**

UK	1999 ⁵			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Manufacturing: Total	88,000	52,000	20,000	13,000
Chemicals	36,000	17,000	10,000	8,000
Mechanical engineering	11,000	8,000	2,000	1,000
Services	31,000	20,000	5,000	5,000
Other: Total	5,000	2,000	0	0
Agriculture, hunting & forestry; Fishing	2,000	0	0	0
Extractive industries	2,000	1,000	0	0
Electricity, gas & water supply	1,000	1,000	0	0
Construction				
GRAND TOTAL	124,000	74,000	25,000	18,000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 10 of MA14

5 1999 and 2000 calculated from detailed product group from Table 10 MA14

6 2001 onwards are provided by ONS as a special analysis at broad sector level. This prevents the omission of data which would be disclosive at detailed level.

Table 7A
EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
Detailed Product Groups 2002

Employment
Full time equivalent

	2002			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Scotland				
Agriculture, hunting and forestry: Fishing	15	8	3	3
Extractive Industries	136	111	4	20
Food Products and beverages: Tobacco products	155	81	56	18
Textiles, clothing and leather products	47	10	14	22
Pulp, paper and paper products; Printing and publishing: Wood and straw products	17	8	7	2
Refined petroleum products and coke oven products: Processing of nuclear fuel	..	..	..	..
Chemicals. Man-made fibres	478	205	224	49
Pharmaceuticals, medical chemicals and botanical products	3 114	1 005	384	1 725
Rubber and plastic products	218	132	57	28
Other non-metallic mineral products	..	..	..	..
Casting of iron and steel	12	7	4	2
Non-ferrous metals	..	..	..	..
Fabricated metal products	109	75	16	18
Machinery and equipment	696	525	51	119
Office machinery and computers	39	31	..	..
Electrical machinery and apparatus	395	293	..	..
Radio, television and communication equipment	2 859	2 440	185	234
Precision instruments	743	581	68	94
Motor vehicles and parts	59	33	12	13
Other transport equipment	..	..	..	..
Shipbuilding and repairs	..	..	..	..
Aerospace	..	..	..	..
Furniture: Other manufactured goods	60	49	5	6
Recycling	..	..	..	..
Electricity, gas and water supply	..	..	..	..
Construction	..	..	..	..
Wholesale and retail trade	71	18	41	12
Transport and storage	..	..	..	..
Post and telecommunications	..	..	..	..
Miscellaneous business activities: Technical testing and analysis	337	162	74	101
Computer and related activities	377	195	90	92
Research and development services	451	357	45	50
Public administration	25	16	3	6
GRAND TOTAL	10 808	6 641	1 456	2 711

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 This data is provided for the whole of the UK in table 10 of MA14

(Continued on next page)

Table 7A(continued)
EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
Detailed Product Groups 2002

Employment
Full time equivalent

	2002			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
UK				
Agriculture, hunting and forestry: Fishing	2,000	1,000		
Extractive Industries				
Food Products and beverages: Tobacco products	4,000	2,000	1,000	
Textiles, clothing and leather products	1,000			
Pulp, paper and paper products; Printing and publishing: Wood and straw products	1,000			
Refined petroleum products and coke oven products: Processing of nuclear fuel	2,000	1,000	1,000	
Chemicals. Man-made fibres	9,000	4,000	3,000	1,000
Pharmaceuticals, medical chemicals and botanical products	29,000	14,000	6,000	9,000
Rubber and plastic products	1,000	1,000		
Other non-metallic mineral products	1,000	1,000		
Casting of iron and steel	1,000			
Non-ferrous metals				
Fabricated metal products	1,000	1,000		
Machinery and equipment	14,000	11,000	2,000	2,000
Office machinery and computers	2,000	2,000		
Electrical machinery and apparatus	8,000	6,000	1,000	1,000
Radio, television and communication equipment	14,000	11,000	2,000	2,000
Precision instruments	6,000	5,000	1,000	1,000
Motor vehicles and parts	11,000	7,000	2,000	2,000
Other transport equipment				
Shipbuilding and repairs				
Aerospace	14,000	8,000	3,000	3,000
<i>Transport equipment and Aerospace</i>	25,000	15,000	5,000	5,000
Furniture: Other manufactured goods	1,000	1,000		
Recycling				
Electricity, gas and water supply	1,000	1,000		
Construction	1,000	1,000		
Wholesale and retail trade	2,000		1,000	
Transport and storage				
Post and telecommunications	7,000	5,000	1,000	1,000
Miscellaneous business activities: Technical testing and analysis	8,000	5,000	1,000	2,000
Computer and related activities	13,000	7,000	2,000	4,000
Research and development services	9,000	7,000	1,000	1,000
Public administration				
GRAND TOTAL	167,000	105,000	30,000	32,000

Source: Table 10 MA14

Table 7A
EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
Detailed Product Groups 2001

Scotland	2001			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Agriculture, hunting and forestry: Fishing	..	..	..	..
Extractive Industries	55	48	..	..
Food Products and beverages: Tobacco products	151	89	40	21
Textiles, clothing and leather products	33	19	10	..
Pulp, paper and paper products; Printing and publishing: Wood and straw products	..	..	..	..
Refined petroleum products and coke oven products: Processing of nuclear fuel	-	-	-	-
Chemicals. Man-made fibres	423	185	210	27
Pharmaceuticals, medical chemicals and botanical products	2 047	569	373	1 105
Rubber and plastic products	28	13	8	7
Other non-metallic mineral products	..	..	..	..
Casting of iron and steel	..	..	..	..
Non-ferrous metals	..	..	..	..
Fabricated metal products	80	56	12	11
Machinery and equipment	667	558	60	49
Office machinery and computers	144	116	19	9
Electrical machinery and apparatus	1 344	1 056	195	92
Radio, television and communication equipment	274	175	22	76
Precision instruments	1 029	796	105	128
Motor vehicles and parts	45	26	10	9
Other transport equipment	..	..	..	..
Shipbuilding and repairs	..	..	..	..
Aerospace	..	..	..	..
Furniture: Other manufactured goods	38	21	7	10
Recycling	-	-	-	-
Electricity, gas and water supply	..	..	..	..
Construction	25	22	-	3
Wholesale and retail trade	35	13	16	6
Transport and storage	..	..	..	..
Post and telecommunications	..	..	..	..
Miscellaneous business activities: Technical testing and analysis	248	58	19	172
Computer and related activities	276	157	39	81
Research and development services	392	304	37	51
Public administration	..	..	..	..
GRAND TOTAL	7 605	4 445	1 258	1 902

- 1 - denotes nil, figures unavailable or too small to display
2 .. denotes disclosive value
3 This data is provided for the whole of the UK in table 10 of MA14

(Continued on next page)

Table 7A(Continued)
EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
Detailed Product Groups 2001

UK	2001			
	R&D employment	Scientists and Engineers	Technicians laboratory assistants and draughtsmen	Administrative clerical and others
Agriculture, hunting and forestry: Fishing	..	..	..	..
Extractive Industries	..	..	..	..
Food Products and beverages: Tobacco products	4,000	2,000	1,000	1,000
Textiles, clothing and leather products	1,000	..	..	..
Pulp, paper and paper products; Printing and publishing: Wood and straw products	1,000	..	..	..
Refined petroleum products and coke oven products: Processing of nuclear fuel	2,000	1,000	1,000	..
Chemicals. Man-made fibres	8,000	4,000	3,000	1,000
Pharmaceuticals, medical chemicals and botanical products	27,000	13,000	5,000	8,000
Rubber and plastic products	1,000	..	..	..
Other non-metallic mineral products	1,000	1,000	..	..
Casting of iron and steel	1,000	..	..	..
Non-ferrous metals	..	..	..	..
Fabricated metal products	1,000	1,000	..	..
Machinery and equipment	10,000	8,000	1,000	1,000
Office machinery and computers	2,000	1,000	..	..
Electrical machinery and apparatus	8,000	6,000	1,000	1,000
Radio, television and communication equipment	11,000	9,000	1,000	1,000
Precision instruments	7,000	6,000	1,000	1,000
Motor vehicles and parts	11,000	6,000	2,000	2,000
Other transport equipment	1,000	..	..	..
Shipbuilding and repairs	2,000	1,000	..	..
Aerospace	14,000	7,000	3,000	3,000
Transport equipment and Aerospace	17,000	8,000	3,000	3,000
Furniture: Other manufactured goods	1,000	1,000	..	..
Recycling	..	..	..	..
Electricity, gas and water supply	2,000	1,000	..	..
Construction	1,000	..	..	..
Wholesale and retail trade	1,000	1,000	1,000	..
Transport and storage	..	..	..	..
Post and telecommunications	7,000	4,000	2,000	1,000
Miscellaneous business activities: Technical testing and analysis	6,000	3,000	..	3,000
Computer and related activities	11,000	6,000	1,000	3,000
Research and development services	9,000	7,000	1,000	1,000
Public administration	1,000	..	..	..
GRAND TOTAL	152,000	93,000	28,000	31,000

Table 8:
EMPLOYMENT ON R&D PERFORMED WITHIN SCOTTISH BUSINESSES:
CIVIL

	Full time equivalent								
Scotland	1994	1995	1996	1997	1998	1999	2000	2001*	2002
Scientist and engineers	1,794	1,904	2,436	2,307	3,154	2,836	2,373	3552	6 371
Technicians laboratory assistants & draughtsmen	..	561	652	586	783	883	933	1114	1 391
Admin. Clerical industrial & other staff	..	487	530	497	589	1,534	1,314	1795	2 640
GRAND TOTAL	3 247	2,952	3,619	3,390	4,526	5,253	4,620	6462	10 402

	Full time equivalent								
DEFENCE	1994	1995	1996	1997	1998	1999	2000	2001*	2002
Scotland	1,081	1,602	1,797	1,559	1,420	1,087	1,062	902	270
Scientist and engineers	1,081	1,602	1,797	1,559	1,420	1,087	1,062	902	270
Technicians laboratory assistants & draughtsmen	..	429	463	370	222	186	184	156	65
Admin. Clerical industrial & other staff	315	425	451	362	191	177	166	84	70
GRAND TOTAL	1,779	2,456	2,710	2,292	1,833	1,450	1,412	1 143	405

Source Table 8 ONS Scottish R&D Report

* 2001 data have been revised due to availability of updated company information

(Continued on next page)

Table 8: (Continued)

EMPLOYMENT ON CIVIL AND DEFENCE R&D PERFORMED WITHIN UK BUSINESSES:

	Full time equivalent								
CIVIL	1994	1995	1996	1997	1998	1999	2000	2001*	2002
UK	66,000	69,000	70,000	71,000	79,000	79,000	74,000	77,000	86,000
Scientist and engineers	66,000	69,000	70,000	71,000	79,000	79,000	74,000	77,000	86,000
Technicians laboratory assistants & draughtsmen	34,000	28,000	29,000	25,000	28,000	28,000	26,000	24,000	26,000
Admin. Clerical industrial & other staff	26,000	25,000	23,000	21,000	21,000	25,000	27,000	28,000	28,000
GRAND TOTAL	127,000	122,000	122,000	117,000	128,000	132,000	127,000	129,000	140,000

	Full time equivalent								
DEFENCE	1994	1995	1996	1997	1998	1999	2000	2001*	2002
UK	13,000	13,000	12,000	12,000	12,000	13,000	12,000	17000	18000
Scientist and engineers	13,000	13,000	12,000	12,000	12,000	13,000	12,000	17000	18000
Technicians laboratory assistants & draughtsmen	6,000	5,000	4,000	4,000	4,000	5,000	4,000	4000	5000
Admin. Clerical industrial & other staff	5,000	5,000	4,000	3,000	4,000	3,000	3,000	3000	3000
GRAND TOTAL	24,000	22,000	20,000	20,000	20,000	21,000	19,000	23,000	27000

Source MA14 Table 11

* 2001 data have been revised due to availability of updated company information

Table 9

**EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

Scotland	2002		
	Total	Civil	Defence
	£ Thousands		
Manufacturing: Total	551,625	526,470	25,155
Chemicals	246,824	..	..
Mechanical engineering	57,373	55,611	1,763
Electrical machinery	141,435	129,432	12,004
Transport equipment and Aerospace	13,165	..	..
Other manufactured products	92,827	..	..
Services	69,849	63,864	5,985
Other: Total	18,599	18,599	-
Agriculture, hunting & forestry; Fishing	547	547	-
Extractive industries	15,126	15,126	-
Electricity, gas & water supply	..	..	0
Construction	..	..	0
TOTAL	640,073	608,933	31,140

(Continued on next page)

Source: ONS special analysis

Table 9

UK

**EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

UK	2002 ⁶		
	Total	Civil	Defence
	£ Thousand		
Manufacturing: Total	10,140,000	8,626,000	1,514,000
Chemicals	3,887,000	3,885,000	2,000
Mechanical engineering	826,000	524,000	302,000
Electrical machinery	1,565,000	1,204,000	361,000
Transport equipment & aerospace	2,591,000	1,785,000	806,000
Other manufactured products	1,272,000	1,228,000	44,000
Services	2,645,000	2,511,000	135,000
Other: Total	324,000	324,000	0
Agriculture, hunting & forestry; Fishing	122,000	122,000	0
Extractive industries	52,000	52,000	0
Electricity, gas & water supply	116,000	116,000	0
Construction	35,000	35,000	0
GRAND TOTAL	13,110,000	11,461,000	1,649,000

Source: Office for National Statistics Special Analysis

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 12 of MA14

5 Data up to 2000 Aggregated from detailed product groups in tabel 12 MA14

6 Data from 2001 onwards from ONS special analysis

Table 9
EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2001

Scotland	2001		
	Total	Civil	Defence
	£ Thousands		
Manufacturing: Total	461,847	365,549	96,298
Chemicals	161,224	..	..
Mechanical engineering	52,014	..	..
Electrical machinery	126,459	32,424	94,035
Transport equipment and Aerospace	3,701	..	..
Other manufactured products	118,450	117,990	460
Services	42,545	..	..
Other: Total	7,983	..	..
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	6,271	6,271	-
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	512,376	415,773	96,603

(Continued on next page)

Table 9
UK
EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 2001

UK	2001 ⁶		
	Total	Civil	Defence
	£ Thousand		
Manufacturing: Total	10,079,000	7,955,000	1,959,000
Chemicals	772,000	3,562,000	0
Mechanical engineering	83,000	412,000	565,000
Electrical machinery	1,667,000	1,201,000	533,000
Transport equipment & aerospace	1,649,000	1,700,000	721,000
Other manufactured products	5,908,000	1,080,000	140,000
Services	2,390,000	1,249,000	53,000
Other: Total	265,000	265,000	0
Agriculture, hunting & forestry; Fishing	96,000	96,000	0
Extractive industries	40,000	40,000	0
Electricity, gas & water supply	99,000	99,000	0
Construction	30,000	30,000	0
GRAND TOTAL	12,336,000	10,513,000	1,824,000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 12 of MA14

5 Data up to 2000 Aggregated from detailed product groups in tabel 12 MA14

6 Data from 2001 onwards from ONS special analysis

Table 9
EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2000

Scotland	2000		
	Total	Civil	Defence
£ Thousands			
Manufacturing: Total	359,350	238,344	121,006
Chemicals	131,767	..	..
Mechanical engineering	55,989	..	..
Electrical machinery	136,156	27,134	109,021
Transport equipment and Aerospace	3,543	..	..
Other manufactured products	31,896	23,410	8,486
Services	33,679	..	..
Other: Total	6,829	..	..
Agriculture, hunting & forestry; Fishing	..	..	0
Extractive industries	4,540	4,540	0
Electricity, gas & water supply	657	657	0
Construction	..	..	0
TOTAL	399,858	277,253	122,605

(Continued on next page)

Table 9

UK

EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS,

UK	2000 ³		
	Total	Civil	Defence
£ Thousand			
Manufacturing: Total	9144 000	7404 000	1571 000
Chemicals	3,528,000	3,527,000	0
Mechanical engineering	776,000	395,000	308,000
Electrical machinery	1,559,000	1,163,000	395,000
Transport equipment & aerospace	2,185,000	1,478,000	635,000
Other manufactured products	1,096,000	841,000	233,000
Services	1,946,000	1,153,000	18,000
Other: Total	375,000	375,000	0
Agriculture, hunting & forestry; Fishing	135,000	135,000	0
Extractive industries	46,000	46,000	0
Electricity, gas & water supply	160,000	160,000	0
Construction	34,000	34,000	0
GRAND TOTAL	11,510,000	9,838,000	1,671,000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 12 of MA14

5 Data up to 2000 Aggregated from detailed product groups in tabel 12 MA14

6 Data from 2001 onwards from ONS special analysis

Table 9
EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 1999

Scotland	1999		
	Total	Civil	Defence
	£ Thousands		
Manufacturing: Total	315,498	235,221	80,277
Chemicals	134,984	..	..
Mechanical engineering	55,623	54,720	903
Electrical machinery	96,062	..	..
Transport equipment and Aerospace	3,342	..	..
Other manufactured products	25,488	15,548	9,940
Services	65,157	..	..
Other: Total	12,753	..	..
Agriculture, hunting & forestry; Fishing	..	..	0
Extractive industries	8,688	8,688	0
Electricity, gas & water supply	..	..	0
Construction	..	..	0
TOTAL	393,408	305,678	87,730

(Continued on next page)

Table 9
EXPENDITURE ON CIVIL AND DEFENCE R&D PERFORMED IN UK BUSINESSES:
BROAD PRODUCT GROUPS, 1999

UK	1999 ³		
	Total	Civil	Defence
	£ Thousand		
Manufacturing: Total	8995 000	7256 000	1615 000
Chemicals	3,253,000	3,252,000	1,000
Mechanical engineering	712,000	433,000	279,000
Electrical machinery	1,335,000	1,013,000	322,000
Transport equipment & aerospace	2,472,000	1,598,000	775,000
Other manufactured products	1,223,000	960,000	238,000
Services	1,971,000	1,051,000	11,000
Other: Total	335,000	335,000	0
Agriculture, hunting & forestry; Fishing	115,000	115,000	0
Extractive industries	42,000	42,000	0
Electricity, gas & water supply	137,000	137,000	0
Construction	41,000	41,000	0
GRAND TOTAL	11,302,000	9,626,000	1,675,000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for detailed product groups in table 12 of MA14

5 Data up to 2000 Aggregated from detailed product groups in tabel 12 MA14

6 Data from 2001 onwards from ONS special analysis

Table 10
Current and Capital Expenditure on R&D Performed in Scottish Businesses
1994 to 2002

	£ Thousands								
Scotland	1994	1995	1996	1997	1998	1999	2000	2001 ²	2002
TOTAL	263,229	268,734	301,705	290,835	357,514	393,408	399,858	512376	640073
Capital total	15,702	16,845	14,549	20,940	30,830	37,900	50,963	57614	43694
of which:									
Land and buildings	1,578	2,039	1,253	4,024	12,963	11,401	30,901	20187	13889
Plant and machinery	14,124	14,807	13,296	16,916	17,867	26,499	20,061	37327	29807
Current total	247,527	251,889	287,156	269,896	326,684	355,508	348,895	454762	596379
of which:									
Salaries and wages	101,005	104,171	127,646	116,884	140,367	158,285	157,974	223497	291286
Other	146,521	147,718	159,510	153,011	186,317	197,223	190,921	231112	305093

Source Table 10 ONS Scottish R&D Report

Table 10
UK
Current and Capital Expenditure on R&D (Total) Performed in UK Businesses
1994 to 2002

	£ Thousands								
UK	1994	1995	1996	1997	1998	1999	2000	2001 ²	2002
TOTAL	8,842,000	9,116,000	9,297,000	9,556,000	10,133,000	11,302,000	11,510,000	12,682,000	13,110,000
Capital total	1,021,000	1,011,000	960,000	1,104,000	1,039,000	1,225,000	1,179,000	1,681,000	1,167,000
of which:									
Land and buildings	381,000	243,000	255,000	338,000	332,000	374,000	398,000	791,000	329,000
Plant and machinery	640,000	768,000	705,000	766,000	707,000	851,000	781,000	890,000	838,000
Current total	7,821,000	8,105,000	8,337,000	8,452,000	9,094,000	10,077,000	10,331,000	11,001,000	11,943,000
of which:									
Salaries and wages	3,810,000	3,585,000	3,710,000	3,683,000	4,012,000	4,491,000	4,625,000	4,978,000	5,763,000
Other	4,012,000	4,520,000	4,627,000	4,769,000	5,082,000	5,586,000	5,706,000	6,023,000	6,180,000

Source: Table 13 MA14

1. On July 2001, the Government research agency, the Defence Evaluation and Research Agency (DERA) was disestablished and two new organisations were created. Around a quarter of DERA remained within the Ministry of Defence (MOD) as a government agency.
2. Data for 2001 have been revised due to the availability of updated company information.

10A

**CURRENT AND CAPITAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2002**

£ thousand

Scotland	2002				
	Total	Capital Total	Current Total	Salaries and wages	Other current
Manufacturing: Total	551,625	36,819	514,806	243,732	271,074
Chemicals	246,824	18,546	228,278	110,908	117,370
Mechanical engineering	57,373	980	56,394	26,427	29,967
Electrical machinery	141,435	..	..	66,605	..
Transport equipment & aerospace	13,165	..	..	5,390	..
Other manufactured products	92,827	9,739	83,088	34,401	48,687
Services	69,849	6,149	63,700	38,405	25,295
Other: Total	18,599	726	17,873	9,149	8,723
Agriculture, hunting & forestry; Fishing	547	118	428	228	201
Extractive industries	15,126	454	14,671	7,260	7,411
Electricity, gas & water supply	..	..	..	..	..
Construction	..	..	..	..	..
GRAND TOTAL	640,073	43,694	596,379	291,286	305,093

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 4 of MA14

Table 10A

**Current and Capital Expenditure on R&D performed in UK Businesses:
Broad Product Groups Aggregated from Detailed Product Groups, 2002**

£ thousand

UK	2002				
	Total	Capital Total	Current Total	Salaries and wages	Other current
Manufacturing: Total	7,549,000	660,000	6,720,000	3,235,000	3,485,000
Chemicals	3,887,000	552,000	3,334,000	1,525,000	1,808,000
Mechanical engineering	826,000	37,000	789,000	433,000	354,000
Electrical machinery	1,565,000	71,000	1,493,000	753,000	742,000
Transport equipment & aerospace	..	..	..	..	..
Other manufactured products	1,271,000	..	..	..	..
Services	2,645,000	175,000	2,468,000	1,362,000	1,108,000
Other: Total	325,000	37,000	287,000	163,000	125,000
Agriculture, hunting & forestry; Fishing	122,000	26,000	95,000	51,000	45,000
Extractive industries	52,000	3,000	49,000	26,000	23,000
Electricity, gas & water supply	116,000	901,000	110,000	66,000	44,000
Construction	35,000	2,000	33,000	20,000	13,000
GRAND TOTAL	13,110,000	1,167,000	11,943,000	5,763,000	6,180,000

Source: ONS: Table 4 MA14

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 4 of MA14

10A

**CURRENT AND CAPITAL EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
BROAD PRODUCT GROUPS, 2001**

£ thousand

Scotland	2001				
	Total	Capital Total	Current Total	Salaries and wages	Other current
Manufacturing: Total	461847	53,258	408,589	198,096	210,493
Chemicals	161224	14,551	146,673	73,303	73,370
Mechanical engineering	52014	794	51,220	24,723	26,497
Electrical machinery	126459	..	..	43,534	..
Transport equipment & aerospace	3701	..	..	1,579	..
Other manufactured products	118450	13,492	104,958	54,957	50,002
Services	42545	4,004	38,542	20,996	17,546
Other: Total	7983	352	7,631	4,405	3,226
Agriculture, hunting & forestry; Fishing	..	..	..	..	..
Extractive industries	6271	215	6,056	3,469	2,587
Electricity, gas & water supply	..	..	..	..	..
Construction	..	..	..	..	..
GRAND TOTAL	512376	57,614	454,762	223,497	231,265

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 4 of MA14

Table 10A

**Current and Capital Expenditure on R&D performed in UK Businesses:
Broad Product Groups Aggregated from Detailed Product Groups, 2001**

£ thousand

UK	2001				
	Total	Capital Total	Current Total	Salaries and wages	Other current
Manufacturing: Total	10,040,000	1,349,001	6,355,000	3,214,000	2,954,000
Chemicals	3,562,000	553,000	3,010,000	1,313,000	1,696,000
Mechanical engineering	1,041,000	222,000	818,000	373,000	445,000
Electrical machinery	1,734,000	300,000	1,434,000	621,000	813,000
Transport equipment & aerospace	2,421,000	85,000	..	907,000	..
Other manufactured products	1,282,000	189,001	1,093,000	..	..
Services	2,378,000	308,000	2,070,000	1,076,000	4,520,000
Other: Total	265,000	21,000	242,000	132,000	111,000
Agriculture, hunting & forestry; Fishing	96,000	16,000	79,000	40,000	39,000
Extractive industries	40,000	1,000	38,000	21,000	17,000
Electricity, gas & water supply	99,000	2,000	97,000	53,000	44,000
Construction	30,000	2,000	28,000	18,000	11,000
GRAND TOTAL	12,682,000	1,681,000	11,001,000	4,978,000	6,023,000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 4 of MA14

**Table 11:
EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2002**

Scotland	2002		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	10,808	640,073	17,580
Enterprise groups with the largest expenditure on R&D			
Top 5	295	23,256	9,911
Top 10	295	23,256	9,911
Top 15	333	27,206	10,163
Top 20	4,569	216,968	10,874
Top 50	5,066	282,855	10,874
Top 100	6,236	383,963	11,600

Source Table 11 ONS Scottish R&D Report

1 This data is provided for the whole of the UK in table 18 of MA14

**EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2002**

UK	2002		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	167,000	13,110,000	884,000
Enterprise groups with the largest expenditure on R&D			
Top 5	31,000	3,315,000	288,000
Top 10	44,000	4,643,000	463,000
Top 15	51,000	5,295,000	496,000
Top 20	62,000	5,840,000	593,000
Top 50	82,000	7,738,000	665,000
Top 100	98,000	9,119,000	784,000

Source: Table 18 MA14 ONS

**Table 11:
EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2001**

Scotland	2001		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	7,605	512,376	65,340
Enterprise groups with the largest expenditure on R&D			
Top 5	..	..	..
Top 10	..	..	..
Top 15	..	..	..
Top 20	2,227	165,690	..
Top 50	3,123	272,558	..
Top 100	4,270	360,676	..

1 This data is provided for the whole of the UK in table 18 of MA14

**EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2001**

UK	2001		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	152,000	12,682,000	1,504,000
Enterprise groups with the largest expenditure on R&D			
Top 5	29,000	3,505,000	830,000
Top 10	46,000	5,272,000	1,137,000
Top 15	54,000	6,160,000	1,137,000
Top 20	60,000	6,702,000	1,139,000
Top 50	79,000	8,418,000	1,258,000
Top 100	94,000	9,723,000	1,387,000

**Table 11:
EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2000**

Scotland	2000		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	6,032	399,858	60,520
Enterprise groups with the largest expenditure on R&D			
Top 5	2,900	256,935	52,507
Top 10	3,199	282,555	53,183
Top 15	3,500	296,890	54,746
Top 20	3,766	307,232	55,409
Top 50	4,320	334,590	56,798
Top 100	4,673	348,955	57,782

1 This data is provided for the whole of the UK in table 18 of MA14

**EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
TOP 100 ENTERPRISE GROUPS, 2000**

UK	2000		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
TOTAL ALL ENTERPRISES	145,000	11,510,000	1,013,000
Enterprise groups with the largest expenditure on R&D			
Top 5	27,000	2,981,000	284,000
Top 10	45,000	4,602,000	418,000
Top 15	52,000	5,431,000	639,000
Top 20	57,000	5,986,000	645,000
Top 50	77,000	7,548,000	828,000
Top 100	91,000	8,696,000	897,000

**Table 11:
EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES:
TOP 100 ENTERPRISE GROUPS 1999**

	1999		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
Scotland			
TOTAL ALL ENTERPRISES	6,703	393,408	58,105
Enterprise groups with the largest expenditure on R&D			
Top 5	3,019	209,154	36,756
Top 10	3,564	253,816	41,616
Top 15	4,112	282,862	48,720
Top 20	4,418	301,089	50,628
Top 50	5,105	336,646	54,356
Top 100	5,455	349,455	54,958

1 This data is provided for the whole of the UK in table 18 of MA14

**EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES:
TOP 100 ENTERPRISE GROUPS 1999**

	1999		
	R&D Employment (full-time equivalent)	Total Intramural Expenditure (£ Thousands)	Funded by UK Government (£ Thousands)
UK			
TOTAL ALL ENTERPRISES	153,000	11,302,000	1,157,000
Enterprise groups with the largest expenditure on R&D			
Top 5	30,000	2,590,000	490,000
Top 10	44,000	4,225,000	491,000
Top 15	50,000	5,015,000	588,000
Top 20	57,000	5,587,000	721,000
Top 50	79,000	7,280,000	890,000
Top 100	94,000	8,433,000	1,017,000

Table 12

EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY TOTAL UK COMPANY EMPLOYMENT SIZEBANDS

Broad Product Group, 2002

£ Thousands

Scotland	2002			
	Total All Employees	0 to 99 employees	100 to 399 employees	400+
TOTAL	640,073	109,174	174,558	356,341
Manufacturing Total	551,625	57,670	151,162	342,793
Chemicals	246,824	35,467	39,639	171,718
Mechanical engineering	57,373	3,921	4,957	48,495
Electrical Machinery	141,435	10,407	91,159	39,869
Transport equipment & aerospace	13,165	..	2,590	..
Other manufacturing	92,827	..	12,817	..
Services Total	69,849	48,437	12,976	8,436
Other Total	18,599	3,068	..	..
Agriculture, hunting & forestry; Fishing	547	..	..	..
Extractive industries	15,126	..	..	..
Electricity, gas & water supply	..	..	..	..
Construction	..	..	..	..

Source Table 12 ONS Scottish R&D Report

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

Table 12

EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY TOTAL COMPANY EMPLOYMENT SIZEBANDS

Broad Product Groups, 2002

£ Thousands

UK	2002			
	Total All Employees	0 to 99 employees	100 to 399 employees	400+
TOTAL	13,110,000	1,539,000	1,922,000	9,249,000
Manufacturing Total	10,140,000	839,000	1,411,000	7,891,000
Chemicals	3,887,000	377,000	406,000	2,287,000
Mechanical engineering	826,000	59,000	164,000	484,000
Electrical Machinery	1,565,000	198,000	365,000	917,000
<i>Transport equipment & Aerospace</i>	<i>2,591,000</i>	<i>31,000</i>	<i>222,000</i>	<i>285,400</i>
Transport equipment	1,244,000	29,000	145,000	37,400
Aerospace	1,347,000	2,000	77,000	248,000
Other manufacturing	1,272,000	175,000	252,000	843,000
Services Total	2,645,000	688,000	490,000	1,202,000
Other Total	324,000	12,000	21,000	293,000
Agriculture, hunting & forestry; Fishing	122,000	5,000	..	107,000
Extractive industries	52,000	1,000	14,000	..
Electricity, gas & water supply	116,000	4,000	..	43,000
Construction	35,000	1,000	-	33,000

Source: Table 19 MA14

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

Table 12:

EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY TOTAL UK COMPANY EMPLOYMENT SIZEBANDS

Broad Product Groups, 2001

£ Thousands

Scotland	2001			
	Total All Employees	0 to 99 Employees	100 to 399 Employees	400+ Employees
TOTAL	512 376	46 696	74,534	391146
Manufacturing Total	461,847	14,793	64,281	382774
Chemicals	161,224	3,670	34,373	123181
Mechanical engineering	52,014	1,948	6,696	43370
Electrical Machinery	126,459	..	13,993	..
Transport equipment & aerospace	3,701	..	361	..
Other manufacturing	118,450	..	8,858	..
Services Total	42,545	31,230	..	..
Other Total	7,983	673	..	..
Agriculture, hunting & forestry; Fishing	..	..	..	..
Extractive industries	6,271	..	..	..
Electricity, gas & water supply	..	0	0	..
Construction	..	..	0	..

Source Table 12 ONS Scottish R&D Report

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

Table 12

EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY TOTAL COMPANY EMPLOYMENT SIZEBANDS

Broad Product Groups, 2002

£ Thousands

UK	2001			
	Total All Employees	0 to 99 employees	100 to 399 employees	400+ employees
TOTAL	12,682,000	1,041,000	1,544,000	10,097,000
Manufacturing Total	10,040,000	531,000	1,148,000	7,048,000
Chemicals	3,563,000	141,000	363,000	3,058,000
Mechanical engineering	1,041,000	48,000	144,000	649,000
Electrical Machinery	1,734,000	185,000	241,000	1,079,000
<i>Transport equipment & Aerospace</i>	<i>2,421,000</i>	<i>29,000</i>	<i>141,000</i>	<i>1,080,000</i>
Transport equipment	1,161,000	27,000	88,000	573,000
Aerospace	1,260,000	2,000	53,000	507,000
Other manufacturing	1,282,000	128,000	259,000	765,000
Services Total	2,377,000	498,000	386,000	1,056,000
Other Total	265,000	13,000	9,000	244,000
Agriculture, hunting & forestry; Fishing	96,000	2,000	7,000	..
Extractive industries	40,000	1,000	1,000	39,000
Electricity, gas & water supply	99,000	9,000	1,000	2,000
Construction	30,000	1,000	1,000	29,000

Source: Table 19 MA14

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

Table 12:
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY TOTAL UK COMPANY EMPLOYMENT SIZEBANDS
Broad Product Groups, 2000 £ Thousands

Scotland	2000				
	Total All Employees	0 to 99 Employees	100 to 399 Employees	400 to 999 Employees	>= 1,000 Employees
TOTAL	399,858	44,721	57,692	67,052	230,393
Manufacturing Total	359,350	16,399	49,693	64,014	229,243
Chemicals	131,767	5,054	18,069	..	..
Mechanical engineering	55,989	2,835	5,352	..	..
Electrical Machinery	136,156	3,412	10,843	..	..
Transport equipment & aerospace	3,543	101	1,333	..	..
Other manufacturing	31,896	4,997	14,095	..	..
Services Total	33,679	27,937	4,841	..	..
Other Total	6,829	385	3,158	..	..
Agriculture, hunting & forestry; Fishing	..	..	..	..	..
Extractive industries	4,540	..	2,895	1,482	..
Electricity, gas & water supply	657	..	..	..	..
Construction	..	..	..	..	..

Source Table 12 ONS Scottish R&D Report

- 1 - denotes nil, figures unavailable or too small to display
2 .. denotes disclosive value

Table 12
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY TOTAL COMPANY EMPLOYMENT SIZEBANDS
Broad Product Groups, 2000 £ Thousands

UK	2000				
	Total All Employees	0 to 99 employees	100 to 399 employees	400 to 999 employees	>= 1,000 employees
TOTAL	11,510,000	955,000	1,390,000	1,610,000	7,555,000
Manufacturing Total	9,231,000	430,000	1,142,000	1,365,000	6,294,000
Chemicals	3,528,000	108,000	324,000	438,000	2,658,000
Mechanical engineering	776,000	68,000	141,000	88,000	479,000
Electrical Machinery	1,558,000	108,000	301,000	294,000	855,000
<i>Transport equipment & Aerospace</i>	<i>2,185,000</i>	<i>38,000</i>	<i>116,000</i>	<i>288,000</i>	<i>1,743,000</i>
Transport equipment	1,094,000	36,000	77,000	226,000	755,000
Aerospace	1,091,000	2,000	39,000	62,000	988,000
Other manufacturing	1,183,000	108,000	259,000	257,000	559,000
Services Total	1,905,000	482,000	235,000	118,000	1,070,000
Other Total	374,000	43,000	13,000	127,000	191,000
Agriculture, hunting & forestry; Fishing	135,000	5,000	4,000	..	..
Extractive industries	46,000	..	4,000	11,000	..
Electricity, gas & water supply	160,000	..	1,000	..	..
Construction	34,000	1,000	4,000	27,000	3,000

Source: Table 19 MA14

- 1 - denotes nil, figures unavailable or too small to display
2 .. denotes disclosive value

Table 12A
R&D EMPLOYMENT IN SCOTTISH BUSINESSES BY TOTAL UK COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2002

Scotland	Full Time Equivalent			
	2002			
	UK sizebands			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 + employees
Manufacturing: Total	9 215	983	3 101	5 131
Chemicals	3 591	513	590	2 488
Mechanical engineering	805	88	143	574
Electrical machinery	3 293	..	2 069	..
Transport equipment & aerospace	256	..	59	..
Other manufactured products	1 269	191	240	838
Services	1 394	986	253	155
Other: Total	199	55	100	44
Agriculture, hunting & forestry; Fishing	15	..	..	-
Extractive industries	136	..	..	..
Electricity, gas & water supply	..	..	-	-
Construction	..	..	..	..
GRAND TOTAL	10 808	2 024	3 454	5 330

Source: Office for National Statistics special analysis

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Transport equipment and Aerospace have been combined to prevent disclosive data
- 4 This data is provided for the whole of the UK in table 20 of MA14
- 5 There are several higher sizebands on MA14, these have been added together to compare to the Scotland figures but exclude some disclosive data

Continued on next page UK figures

(Continued)

Table 12A
R&D EMPLOYMENT IN UK BUSINESSES BY TOTAL UK COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2002

UK	Full time equivalents			
	2002			
	UK sizebands			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400+
Manufacturing: Total	124000	14000	22000	87000
Chemicals	38000	6000	5000	21000
Mechanical engineering	16000	1000	3000	8000
Electrical machinery	24000	3000	6000	11000
Transport equipment & aerospace	29000 -	-	3000	10000
Other manufactured products	18000	4000	5000	9000
Services	39000	12000	7000	18000
Other: Total	4000 -	-	-	3000
Agriculture, hunting & forestry; Fishing	2000 -	-	..	..
Extractive industries	-	-	..	..
Electricity, gas & water supply	1000 -	-	..	..
Construction	1000 -	-	..	..
GRAND TOTAL	167000	27000	30000	109000

Source: Office for National Statistics MA14 table 20

- 1 - denotes nil, figures unavailable or too small to display
- 2 .. denotes disclosive value
- 3 Transport equipment and Aerospace have been combined to prevent disclosive data
- 4 This data is provided for the whole of the UK in table 20 of MA14
- 5 There are several higher sizebands on MA14, these have been added together to compare to the Scotland figures but exclude some disclosive data

Table 12A
R&D EMPLOYMENT IN SCOTTISH BUSINESSES BY TOTAL UK COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS,

Scotland	2001			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400+
Manufacturing: Total	6380	492	1174	4714
Chemicals	2469	143	520	1806
Mechanical engineering	747	64	140	543
Electrical machinery	1 761	..	342	..
Transport equipment & aerospace	83	..	8	..
Other manufactured products	1 320	..	164	..
Services	1 129	819	..	..
Other: Total	96	14	..	..
Agriculture, hunting & forestry; Fishing	..	..	..	..
Extractive industries	55	..	..	..
Electricity, gas & water supply	..	-	0	..
Construction	25	..	0	..
GRAND TOTAL	7 605	1 325	1446	4834

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 20 of MA14

5 There are several higher sizebands on MA14, these have been added together to compare to the Scotland figures but exclude some disclosive data

Continued on next page UK figures

(Continued)

Table 12A
R&D EMPLOYMENT IN UK BUSINESSES BY TOTAL UK COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2002

UK	2001			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 + employees
Manufacturing: Total	113000	10,000	18000	72000
Chemicals	35000	2000	5000	27000
Mechanical engineering	12 000	1 000	2000	6000
Electrical machinery	21 000	3 000	4000	12000
Transport equipment & aerospace	27 000	-	2000	14000
Other manufactured products	19 000	3 000	4000	9000
Services	36 000	12 000	6000	13000
Other: Total	4 000	-	-	4000
Agriculture, hunting & forestry; Fishing	..	-	-	-
Extractive industries	..	-	-	-
Electricity, gas & water supply	2 000	-	-	-
Construction	1 000	-	-	-
GRAND TOTAL	152 000	22 000	25000	73000

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 This data is provided for the whole of the UK in table 20 of MA14

5 There are several higher sizebands on MA14, these have been added together to compare to the Scotland figures but exclude some disclosive data

Table 13:
INTRAMURAL EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN SCOTTISH BUSINESSES
BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D

Country of ownership of Scottish Business	Intramural Expenditure £ Thousands									
	1994	1995	1996	1997	1998	1999	2000	2001 ¹	2002	
Scotland	Not available for Scotland until 2001							188 958	157 019	
Rest of United Kingdom ²	194,926	202,073	218,727	190,347	245,160	232,814	294,113	36 069	42 732	
United States	58,116	56,141	69,224	57,052	72,830	118,590	55,863	225 930	348 325	
EU Excluding UK	5,390	..	..	..	..	..	..	41 019	68 554
Rest of the World ³	4,069	3,838	2,257	1,169	5,221	4,863	15,641	19 593	23 444	
GRAND TOTAL	263 229	268 734	301 705	290 835	357 514	393 408	399 858	511 569	640 073	
	Employment Full time equivalent									
Country of ownership of Scottish Business	1994	1995	1996	1997	1998	1999	2000	2001 ¹	2002	
Scotland								3233	3 017	
Rest of United Kingdom ²	4,061	4,343	5,033	4,335	4,640	4,291	4,677	527	669	
United States	754	858	1,029	769	1,284	1,974	783	2,926	5 865	
Other EU	111	..	..	..	194	260	275	596	855
Japan	..	..	..	115	104	72	81	..	..
Rest of the World	81	82	42	17	105	107	190	322	..	
Total rest of the world	81	82	42	132	209	179	271	322	401	
GRAND TOTAL	5,026	5,408	6,329	5,682	6,359	6,703	6,032	7,605	10 808	

Source Table 13 ONS Scottish R&D Report

1. 2001 data revised due to new data becoming available to ONS
2. From 2001, UK data are for the Rest of the UK (not Scotland). Prior to that, data were for the whole of UK (including Scotland)
3. Japan is not separate on this part of the table ; it is included in the Rest of the world, otherwise it would be disclosive.

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Table 13: (Continued)
EXPENDITURE AND EMPLOYMENT ON R&D PERFORMED IN UK BUSINESSES
BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: 1994 TO 2001

Country of ownership of UK business	Intramural Expenditure £ Thousands								
	1994	1995	1996	1997	1998	1999	2000	2001 ¹	2002
United Kingdom ²	n/a	n/a	6,588,000	6,423,000	7,051,000	7,779,000	7,903,000	7,331,000	8,127,000
United States	n/a	n/a	1,472,000	1,640,000	1,620,000	1,513,000	1,301,000	2,760,000	3,016,000
Germany	n/a	n/a	301,000	213,000	309,000	141,000	180,000	212,000	184,000
France	n/a	n/a	151,000	94,000	77,000	154,000	193,000	536,000	491,000
Other EU	n/a	n/a	349,000	580,000	441,000	665,000	1,100,000	696,000	612,000
Japan	n/a	n/a	323,000	244,000	262,000	254,000	229,000	183,000	199,000
Rest of the World	n/a	n/a	247,000	362,000	373,000	795,000	605,000	619,000	481,000
GRAND TOTAL			9,297,000	9,556,000	10,133,000	11,302,000	11,510,000	12,336,000	13,110,000
	Employment Full time equivalent								
Country of ownership of UK business	1994	1995	1996	1997	1998	1999	2000	2001 ¹	2002
United Kingdom ²	n/a	n/a	105,000	100,000	110,000	113,000	107,000	101,000	107,000
United States	n/a	n/a	19,000	19,000	19,000	17,000	15,000	28,000	34,000
Germany	n/a	n/a	4,000	2,000	4,000	2,000	2,000	3,000	3,000
France	n/a	n/a	2,000	1,000	1,000	2,000	3,000	4,000	9,000
Other EU	n/a	n/a	6,000	8,000	5,000	7,000	8,000	7,000	7,000
Japan	n/a	n/a	3,000	2,000	3,000	3,000	3,000	2,000	3,000
Rest of the World	n/a	n/a	4,000	5,000	5,000	9,000	7,000	7,000	6,000
GRAND TOTAL			142,000	137,000	148,000	153,000	145,000	152,000	167,000

Source Table 22 MA14

1. 2001 data revised due to new data becoming available to ONS
2. From 2001, UK data are for the Rest of the UK (not Scotland). Prior to that, data were for the whole of UK (including Scotland)
3. Japan is not separate on this part of the table ; it is included in the Rest of the world, otherwise it would be disclosive.

Table 14:
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2002

Businesses in Scotland	2002					
	Country of Ownership					Total
	Scotland	Rest of the UK	United States	Other EU	Rest of the World	
Manufacturing: Total	100 198	36 785	332 450	59 343	22 848	551 625
Chemicals	61 773	..	..	..	11 063	246 824
Mechanical engineering	5 331	2 889	..	..	3 802	57 373
Electrical machinery	15 636	..	97 547	12 845	..	141 435
Transport equipment & aerospace	3 973	..	..	-	-	13 165
Other manufactured products	13 485	3 831	..	6 102	..	92 827
Services	48 918	..	..	..	..	69 849
Other: Total	7 902	..	..	..	..	18 599
Agriculture, hunting & forestry; Fishing	..	..	..	..	..	..
Extractive industries	..	..	..	..	..	..
Electricity, gas & water supply	..	..	..	..	..	..
Construction	..	..	..	..	..	..
GRAND TOTAL	157 019	42 732	348 325	68 554	23 444	640 073

Source Table 14 ONS Scottish R&D Tables

Table 14
UK
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: DETAILED PRODUCT GROUPS, 2002

Businesses in the UK	2002		
	Country of Ownership		Total
	UK	Overseas ²	
Manufacturing: Total	4,474,000	3,072,000	7,549,000
Chemicals	2,349,000	1,537,000	3,887,000
Mechanical engineering	487,000	338,000	826,000
Electrical machinery	857,000	708,000	1,565,000
Transport equipment & aerospace	..	..	..
Other manufactured products	781,000	489,000	1,271,000
Services	5,896,000	968,000	2,645,000
Other: Total	238,000	131,000	325,000
Agriculture, hunting & forestry; Fishing	..	..	122,000
Extractive industries	31,000	20,000	52,000
Electricity, gas & water supply	192,000	107,000	116,000
Construction	15,000	4,000	35,000
GRAND TOTAL	8,127,000	4,983,000	13,110,000

Source Table 23 MA14

1. UK data are derived from detailed level figures on Table 23 of MA14. Aggregated data do not include disclosive data.
2. Scotland figures are broken down using special analysis by ONS. This breakdown is not available on MA14 for UK so all overseas

Table 14
Scotland
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2001

£ Thousands

Businesses in Scotland	2001					Total
	Country of Ownership					
	Scotland	Rest of the UK	United States	Other EU	Rest of the World	
Manufacturing: Total	149269	34527	219195	38895	19439	461325
Chemicals	29,939	28,453	..	..	3849	161235
Mechanical engineering	3,925	2,435	..	460	..	51481
Electrical machinery	102,438	..	11767	5151	..	126459
Transport equipment & aerospace	3,510	..	..	..	..	3701
Other manufactured products	9,457	..	..	..	5879	118450
Services	34,965	..	..	..	..	42260
Other: Total	4,724	..	..	..	-	7983
Agriculture, hunting & forestry; Fishing	..	-	-	-	-	..
Extractive industries	..	-	-	-	-	6271
Electricity, gas & water supply	..	-	-	-	-	..
Construction	187	..	-	-	-	..
GRAND TOTAL	188,958	36,069	225930	41019	19593	511569

Source Table 14 ONS Scottish R&D Tables

Table 14
UK
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: DETAILED PRODUCT GROUPS, 2001 & 2002

£ Thousands

Businesses in the UK	2001			Total
	Country of Ownership			
	UK	Overseas ²		
Manufacturing: Total	5,586,000	3,914,000		10,040,000
Chemicals	2,088,000	1,475,000		3,562,000
Mechanical engineering	509,000	531,000		1,041,000
Electrical machinery	1,041,000	693,000		1,734,000
Transport equipment & aerospace	1,345,000	784,000		2,421,000
Other manufactured products	603,000	431,000		1,282,000
Services	1,475,000	890,000		2,378,000
Other: Total	222,000	217,000		265,000
Agriculture, hunting & forestry; Fishing	28,000	67,000		96,000
Extractive industries	..	..		40,000
Electricity, gas & water supply	166,000	147,000		99,000
Construction	28,000	3,000		30,000
GRAND TOTAL	7,681,000	5,001,000		12,682,000

Source Table 23 MA14

1. UK data are derived from detailed level figures on Table 23 of MA14. Aggregated data do not include disclosive data.
2. Scotland figures are broken down using special analysis by ONS. This breakdown is not available on MA14 for UK so all overseas are together here.

Table 14
Scotland
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS 2000

£ Thousands

Businesses in Scotland	2000		
	Country of Ownership		
	UK	Overseas	Total
Manufacturing: Total	255,819	103,531	359,350
Chemicals	90,963	40,804	131,767
Mechanical engineering	..	..	..
Electrical machinery	..	..	..
Transport equipment & aerospace	2,426	1,116	3,542
Other manufactured products	29,262	2,634	31,896
Services	..	..	..
Other: Total	..	..	..
Agriculture, hunting & forestry; Fishing	..	-	..
Extractive industries	..	..	..
Electricity, gas & water supply	657	-	657
Construction	..	-	..
GRAND TOTAL	292,732	107,126	399,858

Source Table 14 ONS Scottish R&D Tables

Table 14
UK
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: DETAILED PRODUCT GROUPS, 2000

£ Thousands

Businesses in UK	2000		
	Country of Ownership		
	UK	Overseas	Total
Manufacturing: Total	5,919,000	2,976,000	8,144,000
Chemicals	2,324,000	1,167,000	2,528,000
Mechanical engineering	543,000	233,000	776,000
Electrical machinery	947,000	612,000	1,559,000
Transport equipment & aerospace	1,335,000	777,000	2,185,000
Other manufactured products	770,000	187,000	1,096,000
Services	956,000	250,000	1,856,000
Other: Total	162,000	17,000	375,000
Agriculture, hunting & forestry; Fishing	125,000	9,000	135,000
Extractive industries	37,000	8,000	46,000
Electricity, gas & water supply	..	..	160,000
Construction	..	..	34,000
GRAND TOTAL	7,903,000	3,607,000	11,510,000

Source Table 23 MA14

1. UK data are derived from detailed level figures on Table 23 of MA14. Aggregated data do not include disclosive data.
2. Scotland figures are broken down using special analysis by ONS. This breakdown is not available on MA14 for UK so all overseas are together here.

Table 14
Scotland
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS 1999

£ Thousands

Businesses in Scotland	1999		
	Country of Ownership		
	UK	Overseas	Total
Manufacturing: Total	190,019	125,479	315,498
Chemicals	39,155	95,828	134,983
Mechanical engineering	48,008	7,614	55,622
Electrical machinery	77,703	18,358	96,061
Transport equipment & aerospace	2,366	976	3,342
Other manufactured products	22,786	2,702	25,488
Services	..	..	..
Other: Total	..	..	..
Agriculture, hunting & forestry; Fishing	..	..	..
Extractive industries	..	..	..
Electricity, gas & water supply	..	..	..
Construction	..	..	..
GRAND TOTAL	232,814	160,594	393,408

Source Table 14 ONS Scottish R&D Tables

Table 14
UK
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: DETAILED PRODUCT GROUPS, 1999

£ Thousands

Businesses in the UK	1999		
	Country of Ownership		
	UK	Overseas	Total
Manufacturing: Total	5,572,000	3,424,000	8,995,000
Chemicals	1,949,000	1,304,000	3,253,000
Mechanical engineering	353,000	359,000	712,000
Electrical machinery	802,000	535,000	1,335,000
Transport equipment & aerospace	1,638,000	834,000	2,472,000
Other manufactured products	830,000	392,000	1,223,000
Services	1,038,000	933,000	1,971,000
Other: Total	262,000	71,000	335,000
Agriculture, hunting & forestry; Fishing	85,000	30,000	115,000
Extractive industries	33,000	8,000	42,000
Electricity, gas & water supply	137,000	..	137,000
Construction	7,000	33,000	41,000
GRAND TOTAL	6,873,000	4,429,000	11,302,000

Source Table 23 MA14

1. UK data are derived from detailed level figures on Table 23 of MA14. Aggregated data do not include disclosive data.
2. Scotland figures are broken down using special analysis by ONS. This breakdown is not available on MA14 for UK so all overseas are together here.

Table 14A

NUMBER OF SCOTTISH BUSINESSES PERFORMING R&D BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2002

	2002					Total
	Scotland	Rest of the United Kingdom	United States	Other EU	Rest of the World	
Manufacturing: Total	314	25	41	24	23	427
Chemicals	25	..	..	..	4	38
Mechanical engineering	67	5	..	..	6	97
Electrical machinery	42	..	15	6	..	71
Transport equipment & aerospace	12	..	..	-	-	16
Other manufactured products	168	14	..	7	..	208
Services	414	..	..	..	..	444
Other: Total	22	..	..	..	..	31
Agriculture, hunting & forestry; Fishing						
Extractive industries						
Electricity, gas & water supply						
Construction						
GRAND TOTAL	750	35	55	35	26	901

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

Source: Office for National Statistics special analysis

(Continued on next page)

Table 14A (Continued)

NUMBER OF UK BUSINESSES PERFORMING R&D BY COUNTRY OF OWNERSHIP OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2002

	2002					Total
	Scotland	Rest of the United Kingdom	United States	Other EU	Rest of the World	
Manufacturing: Total	322	4 378	447	397	192	5 736
Chemicals	27	413	70	60	31	601
Mechanical engineering	69	1 033	91	94	34	1 321
Electrical machinery	43	593	87	53	37	813
Transport equipment & aerospace	12	266	57	43	15	393
Other manufactured products	171	2 092	147	153	78	2 641
Services	424	4 995	129	..	..	5 773
Other: Total	23	225	8	..	..	283
Agriculture, hunting & forestry; Fishing						
Extractive industries						
Electricity, gas & water supply						
Construction						
GRAND TOTAL	769	9 589	584	557	279	11 778

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

Source: Office for National Statistics special analysis (Not MA14)

Table 14A**NUMBER OF SCOTTISH BUSINESSES PERFORMING R&D BY COUNTRY OF OWNERSHIP
OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2001**

	2001					Total
	Scotland	Rest of the United Kingdom	United States	Other EU	Rest of the World	
Manufacturing: Total	234	11	35	19	23	322
Chemicals	20	3	..	..	4	34
Mechanical engineering	43	3	..	6	..	66
Electrical machinery	35	..	10	..	..	56
Transport equipment & aerospace	10	..	..	..	..	11
Other manufactured products	126	..	..	..	9	156
Services	298	..	..	..	..	317
Other: Total	14	..	..	..	-	20
Agriculture, hunting & forestry; Fishing	..	-	-	..	-	..
Extractive industries	..	-	..	-	-	9
Electricity, gas & water supply	..	-	-	-	-	..
Construction	6	..	-	-	-	..
GRAND TOTAL	546	16	47	26	24	659

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

Source: Office for National Statistics special analysis

(Continued on next page)

Table 14A (Continued)**NUMBER OF UK BUSINESSES PERFORMING R&D BY COUNTRY OF OWNERSHIP
OF BUSINESS PERFORMING R&D: BROAD PRODUCT GROUPS, 2001**

	2001					Total
	Scotland	Rest of the United Kingdom	United States	Other EU	Rest of the World	
Manufacturing: Total	236	3 489	383	350	167	4 625
Chemicals	20	361	61	56	30	528
Mechanical engineering	44	840	86	77	26	1 073
Electrical machinery	36	485	72	40	41	674
Transport equipment & aerospace	10	209	46	38	8	311
Other manufactured products	126	1 616	122	146	62	2 072
Services	..	4 138	..	111	59	4 727
Other: Total	..	130	..	19	..	174
Agriculture, hunting & forestry; Fishing	..	..	..	..	..	21
Extractive industries	..	..	4	..	..	33
Electricity, gas & water supply	..	13	-	..	-	19
Construction	6	..	..	4	..	102
GRAND TOTAL	550	7 749	507	476	230	9 512

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

Source: Office for National Statistics special analysis (Not MA14)

Table 15
NUMBER OF BUSINESSES PERFORMING R&D IN SCOTLAND BY TOTAL UK
COMPANY EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2002

Scotland	2002 ⁴			
	UK employee sizeband			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 employees and over
Manufacturing: Total	427	258	124	45
Chemicals	38	..	..	6
Mechanical engineering	97	61	28	8
Electrical machinery	71	38	19	14
Transport equipment & aerospace	16	..	..	4
Other manufactured products	208	134	59	15
Services	444	415	..	..
Other: Total	31	18	..	..
Agriculture, hunting & forestry; Fishing				
Extractive industries				
Electricity, gas & water supply				
Construction				
GRAND TOTAL	901	691	155	55

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 From 2002, all employee sizebands for 400 employees and above are aggregated.

UK

Table 15
NUMBER OF BUSINESSES PERFORMING R&D IN UK BY TOTAL COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2002

UK	2002 ⁴			
	UK employee sizeband			
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 employees and over
Manufacturing: Total	5 736	3 379	1 709	648
Chemicals	601	323	172	106
Mechanical engineering	1 321	878	359	84
Electrical machinery	813	474	232	107
Transport equipment & aerospace	393	148	141	104
Other manufactured products	2 641	1 559	812	270
Services	5 773	5 189	463	121
Other: Total	283	169	64	50
Agriculture, hunting & forestry; Fishing				
Extractive industries				
Electricity, gas & water supply				
Construction				
GRAND TOTAL	11 778	8 736	2 236	806

Source: Office for National Statistics Special Analysis

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

4 From 2002, all employee sizebands for 400 employees and above are aggregated.

Table 15

**NUMBER OF BUSINESSES PERFORMING R&D IN SCOTLAND BY TOTAL UK
COMPANY EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2001**

Scotland	2001				
	UK employee sizeband				
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 to 999 employees	1,000 employees and over
Manufacturing: Total	322	178	97	32	15
Chemicals	34	15	11	..	..
Mechanical engineering	66	38	21	..	..
Electrical machinery	56	..	20	8	..
Transport equipment & aerospace	11	..	3	..	-
Other manufactured products	156	..	43	12	..
Services	317	297	..	..	..
Other: Total	20	11	..	..	..
Agriculture, hunting & forestry; Fishing	..	..	..	-	-
Extractive industries	9	..	..	..	..
Electricity, gas & water supply	..	-	-	-	..
Construction	..	..	-	..	..
GRAND TOTAL	659	486	116	38	19

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

UK

Table 15

**NUMBER OF BUSINESSES PERFORMING R&D IN UK BY TOTAL COMPANY
EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS, 2001**

UK	2001				
	UK employee sizeband				
	TOTAL ALL EMPLOYEES	0 to 99 employees	100 to 399 employees	400 to 999 employees	1,000 employees and over
Manufacturing: Total	4 625	2 634	1 390	411	190
Chemicals	528	273	157	61	37
Mechanical engineering	1 073	674	301	73	25
Electrical machinery	674	382	198	61	33
Transport equipment & aerospace	311	116	105	56	34
Other manufactured products	2 072	1 192	637	169	74
Services	4 727	4 335	296	49	47
Other: Total	174	114	18	14	28
Agriculture, hunting & forestry; Fishing	21	..	..	..	3
Extractive industries	33	18	4	6	5
Electricity, gas & water supply	19	..	..	..	13
Construction	102	81	9	5	7
GRAND TOTAL	9 512	7 082	1 703	473	254

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

Table 15

NUMBER OF BUSINESSES PERFORMING R&D IN SCOTLAND BY TOTAL UK COMPANY EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS 2000

Scotland	2000				
	UK employee sizeband				
	TOTAL ALL EMPLOYEES	0 to 99 Employees	100 to 399 Employees	400 to 999 Employees	1,000 Employees and over
Manufacturing: Total	330	164	116	30	20
Chemicals	33	13	13	..	..
Mechanical engineering	71	35	26	5	5
Electrical machinery	59	26	20	9	4
Transport equipment & aerospace	13	4	4	..	..
Other manufactured products	154	86	53	12	3
	283	258	21	..	..
Services					
	18	6	4	..	..
Other: Total	3	..	..	-	-
Agriculture, hunting & forestry; Fishing	10	..	3	3	-
Extractive industries	..	-	-	-	..
Electricity, gas & water supply	..	-	-	..	-
Construction					
GRAND TOTAL	631	428	141	36	26

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

NOT AVAILABLE FOR UK UNTIL 2001

Table 15

NUMBER OF BUSINESSES PERFORMING R&D IN SCOTLAND BY TOTAL UK COMPANY EMPLOYMENT SIZE-BANDS: BROAD PRODUCT GROUPS 1999

Scotland	1999				
	UK employee sizeband				
	TOTAL ALL EMPLOYEES	0 to 99 Employees	100 to 399 Employees	400 to 999 Employees	1,000 Employees and over
Manufacturing: Total	268	109	107	29	23
Chemicals	31	10	14	..	..
Mechanical engineering	48	18	20	6	4
Electrical machinery	48	22	14	7	5
Transport equipment & aerospace	13	5	3	..	..
Other manufactured products	128	54	56	13	5
Services	223	..	10	..	5
Other: Total	16	..	3	..	3
Agriculture, hunting & forestry; Fishing	3	..	..	-	..
Extractive industries	7	..	..	..	-
Electricity, gas & water supply	..	-	-	-	..
Construction	..	..	-	..	-
GRAND TOTAL	507	322	120	34	31

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

NOT AVAILABLE FOR UK UNTIL 2001

Table 16
R&D INTENSITY IN MANUFACTURED PRODUCTS SCOTLAND
Selected Industries

Industry/Sector	2001					
	Scotland R&D Expenditure (£ Millions)	UK R&D Expenditure (£ Millions)	Turnover (£M)		% of Turnover	% of Turnover
			Scotland	UK	Scotland	UK
Pharmaceuticals	134	3,040	..	13,843	..	22.0%
Chemicals/ Man Made Fibres	28	522	..	47,530	..	1.1%
Motor Vehicles & Parts	2	898	493	39,174	0.5%	2.3%
Other Transport Equipment & Aerospace	4	1,551	1663	21,700	0.2%	7.1%
Office Machinery and Computers	6	105	..	14,801	..	0.7%
Electrical machinery and apparatus	103	451	1135	15,827	9.1%	2.8%
Radio, Television and communication equipment	17	1,044	4233	21,178	0.4%	4.9%
Precision Instruments	106	488	1526	..	6.9%	..
Extractive Industries	6	43	306	40,731	2.0%	0.1%

Sources: Table 2 ONS Scottish R&D Report Table 2 MA14 and ABI

Table 16
R&D INTENSITY IN MANUFACTURED PRODUCTS SCOTLAND
Selected Industries

Industry/Sector	2000					
	Scotland R&D Expenditure (£ Millions)	UK R&D Expenditure (£ Millions)	Turnover (£M)		% of Turnover	% of Turnover
			Scotland	UK	Scotland	UK
Pharmaceuticals	115.7	2,846	801	12,108	14.4%	23.5%
Chemicals/ Man Made Fibres	16.1	682	1,927	35,296	0.8%	1.9%
Motor Vehicles & Parts	1.9	864	525	39,881	0.4%	2.2%
Other Transport Equipment & Aerospace	3.5	1,321	1,568	21,484	0.2%	6.1%
Office Machinery and Computers	5.5	113	8,364	15,844	0.1%	0.7%
Electrical machinery and apparatus	115.3	422	996	15,622	11.6%	2.7%
Radio, Television and communication equipment	15.4	1,024	5,140	25,956	0.3%	3.9%
Precision Instruments	22.4	480	1,456	11,834	1.5%	4.1%
Extractive Industries	4.5	46	15,017	36,647	0.0%	0.1%

Sources: Table 2 ONS Scottish R&D Report Table 2 MA14 and ABI

Table 17
GOVERNMENT OFFICES REGIONAL BREAKDOWN OF R&D PERFORMED WITHIN UK BUSINESSES:
BY LOCATION OF ENTERPRISE, 2002

Location of R&D expenditure	Location of Reporting Unit												£million
	TOTAL UK	North East	North West and Merseyside	Yorkshire and Humber	East Midlands	West Midlands	Eastern	London	South East	South West	Wales	Scotland	Northern Ireland
North East	128	80	5	1	..	..	-	13	..	..	..	..	-
North West and Merseyside	1 661	1	894	3	1	18	27	191	..	..	..	3	-
Yorkshire and Humber	357	..	6	282	8	-	9	18	11	..	..	..	-
East Midlands	1 063	..	..	2	351	114	17	..	13	..	..	..	-
West Midlands	695	..	4	1	11	584	7	61	6	..	..	-	..
Eastern	2 741	..	34	..	..	10	1 859	630	162	10	..	1	..
London	950	..	6	..	-	1	32	703	192	5	-	2	-
South East	3 268	..	12	..	..	8	206	166	2 573	76	4	..	-
South West	1 274	..	42	3	..	..	32	327	72	733	..	..	-
Wales	182	-	1	..	..	..	4	1	25	15	135	-	-
Scotland	640	-	..	..	..	..	..	9	211	..	5	285	-
Northern Ireland	149	-	-	-	-	..	..	..	..	..	-	..	112
GRAND TOTAL	13 110	283	1 195	309	417	745	2 231	2 478	3 772	972	214	373	123

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

Table 17
GOVERNMENT OFFICES REGIONAL BREAKDOWN OF R&D PERFORMED WITHIN UK BUSINESSES:
BY LOCATION OF REPORTING UNIT, 2001

Location of R&D expenditure	Location of Reporting Unit												£million
	TOTAL UK	North East	North West and Merseyside	Yorkshire and Humber	East Midlands	West Midlands	Eastern	London	South East	South West	Wales	Scotland	Northern Ireland
North East	118	91 ..	..	..	0	0	0 ..	..	..	0 ..	..	0	0
North West and Merseyside	1512	0	1397 ..	..	..	..	2	45	16 ..	..	..	..	0
Yorkshire and Humber	298	0	10	265	4 ..	..	..	..	..	..	..	0 ..	0
East Midlands	950 ..	..	..	0	698 ..	..	..	..	..	..	..	0 ..	0
West Midlands	641 ..	..	..	..	..	562 ..	..	..	..	..	..	0	0
Eastern	2913 ..	..	75 ..	..	4	22	1784	958	38	11	0	0 ..	0
London	737 ..	..	..	0	0 ..	..	..	685	15 ..	..	..	..	0
South East	3693 ..	..	16	3 ..	..	2	279	122	3050	41 ..	..	68 ..	0
South West	1022	0 ..	..	1 ..	..	38 ..	..	..	42	704	0 ..	..	0
Wales	136 ..	..	..	..	0 ..	..	..	..	11 ..	..	95	0	0
Scotland	512	0	15 ..	..	0 ..	..	10	8 ..	..	..	..	459	0
Northern Ireland	150	0	0	0 ..	..	0	0	0	0	0	0	0 ..	0
GRAND TOTAL	12682	210	1713	299	865	722	2122	1890	3224	810	102	575	150

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

TABLE 18
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY BUSINESS AGE
BROAD PRODUCT GROUPS, 2002

Scotland	Age of Business			
	TOTAL	0-3 years	4 to 9 years	10 years or more
Manufacturing: Total	551 625	..	..	514 305
Chemicals	246 824	-	24 658	222 166
Mechanical engineering	57 373	..	..	55 855
Electrical machinery	141 435	773	3 930	136 732
Transport equipment & aerospace	13 165	-	1 199	11 967
Other manufactured products	92 827	76	5 165	87 585
Services	69 849	6 403	24 792	38 655
Other: Total	18 599	..	..	16 448
Agriculture, hunting & forestry; Fishing	547	..	-	..
Extractive industries	15 126	..	314	..
Electricity, gas & water supply	..	-	..	-
Construction	..	-	..	..
GRAND TOTAL	640 073	7 374	63 292	569 408

£ thousand

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

TABLE 19
NUMBER OF BUSINESSES PERFORMING R&D IN SCOTLAND BY BUSINESS AGE
BROAD PRODUCT GROUPS, 2002

Scotland	Age of Business			
	TOTAL	0-3 years	4 to 9 years	10 years or more
Manufacturing: Total	427	..	..	350
Chemicals	38	-	5	33
Mechanical engineering	97	..	..	79
Electrical machinery	71	5	11	55
Transport equipment & aerospace	16	-	4	12
Other manufactured products	208	6	28	174
Services	444	86	157	201
Other: Total	31	..	..	22
Agriculture, hunting & forestry; Fishing	5	..	-	..
Extractive industries	12	..	4	..
Electricity, gas & water supply	..	-	..	-
Construction	..	-	..	..
GRAND TOTAL	901	103	226	572

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

TABLE 20
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY BUSINESS AGE
LOCATION OF ENTERPRISE ADDRESS 2002

Businesses in Scotland	Age of Business				£ thousand
	TOTAL	0-3 years	4 to 9 years	10 years or more	
Location of enterprise address					
Scotland	285 335	..	..	220 636	
Rest of UK	354 738	..	..	348 772	
GRAND TOTAL	640 073	7 374	63 292	569 408	

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

TABLE 21
NUMBER OF BUSINESSES UNDERTAKING R&D IN SCOTLAND
BY LOCATION OF ENTERPRISE ADDRESS

2002

Businesses in Scotland	Age of Business			
	TOTAL	0-3 years	4 to 9 years	10 years or more
Location of enterprise address				
Scotland	843	..	..	522
Rest of UK	58	..	..	50
GRAND TOTAL	901	103	226	572

Source: Office for National Statistics

- 1 - denotes nil, figures unavailable or too small to display
2 .. denotes disclosive value

TABLE 22
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES BY SIC OF ENTERPRISE:
BROAD PRODUCT GROUPS, 2002

£ thousand

Scotland	Manufacturing SICs		Research & Development	OTHER
	TOTAL	15 - 37	SIC 73	
Manufacturing: Total	551 625	340 457	196 278	14 889
Chemicals	246 824	52 652	194 172	-
Mechanical engineering	57 373	57 373	-	-
Electrical machinery	141 435	..	..	14 789
Transport equipment & aerospace	13 165	13 165	-	-
Other manufactured products	92 827	..	..	100
Services	69 849	..	..	43 100
Other: Total	18 599	..	..	7 420
Agriculture, hunting & forestry; Fishing	547	-	-	547
Extractive industries	15 126	..	..	6 760
Electricity, gas & water supply	..	..	-	-
Construction	..	..	..	114
GRAND TOTAL	640 073	356 328	218 335	65 410

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

3 Transport equipment and Aerospace have been combined to prevent disclosive data

TABLE 22
EXPENDITURE ON R&D PERFORMED IN UK BUSINESSES BY SIC OF ENTERPRISE:
BROAD PRODUCT GROUPS, 2002

£ thousand

UK	Manufacturing SICs		Research & Development	OTHER
	TOTAL	15 - 37	SIC 73	
Manufacturing: Total	10,140,000	6,557,000	2,678,000	906,000
Chemicals	3,887,000	1,587,000	2,002,000	298,000
Mechanical engineering	826,000	615,000 ..	..	..
Electrical machinery	1,565,000	1,160,000	207,000	198,000
Transport equipment	1,244,000	874,000	111,000	259,000
Aerospace	1,347,000	1,291,000 ..	..	..
Other manufactured products	1,272,000	1,030,000	168,000	74,000
Services	2,645,000	289,000	585,000	1,772,000
Other: Total	324,000	15,000	210,000	99,000
Agriculture, hunting & forestry; Fishing	122,000 ..	..	..	11,000
Extractive industries	52,000 ..	..	..	34,000
Electricity, gas & water supply	116,000 ..	..	..	44,000
Construction	35,000 ..	..	..	10,000
TOTAL OF DATA PROVIDED	13,110,000	6,846,000	3,072,000	2,700,000
TOTAL OF DISCLOSIVE DATA	0	15,000	401,000	77,000
GRAND TOTAL	13,110,000	6,860,000	3,472,000	2,777,000

Source: Office for National Statistics

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value

TABLE 23
EXPENDITURE ON R&D PERFORMED IN SCOTTISH BUSINESSES:
UNITARY AUTHORITY LEVEL, 2000 TO 2002

Unitary Authority in Scotland	£ thousand		
	2000	2001	2002
Aberdeen City	19 448	19 114	28 819
Aberdeenshire	2 746	3 211	6 139
Angus	1 535	704	..
Argyll & Bute	1 048	..	..
The Scottish Borders	871	..	1 377
Clackmannanshire	..	..	..
West Dunbartonshire	..	..	4 426
Dumfries & Galloway	756	..	1 859
Dundee City	39 582	45 682	57 816
East Ayrshire	982	1 318	1 312
East Dunbartonshire	1 171	725	1 164
East Lothian	6 467	..	..
East Renfrewshire	..	..	..
City of Edinburgh	121 204	203 008	125 910
Falkirk	9 731	..	12 700
Fife	15 393	10 719	15 047
Glasgow City	18 883	10 231	19 531
Highland	..	1 642	11 808
Inverclyde	..	..	..
Midlothian	4 584	6 391	30 234
Moray	..	..	..
North Ayrshire	..	2 152	..
North Lanarkshire	39 700	43 035	55 272
Orkney Islands	..	..	..
Perth & Kinross	1 044	460	816
Renfrewshire	12 865	12 993	12 512
Shetland Islands	-	-	..
South Ayrshire	1 245	..	720
South Lanarkshire	10 405	14 442	38 147
Stirling	1 128	801	2 465
West Lothian	79 644	82 356	190 729
Western Isles	..	..	..
GRAND TOTAL	399 858	512 376	640 073

1 - denotes nil, figures unavailable or too small to display

2 .. denotes disclosive value