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**RESEARCH AND EXPERIMENTAL
DEVELOPMENT**

**BUSINESS ENTERPRISES
AUSTRALIA
1984-85**

IAN CASTLES

Australian Statistician

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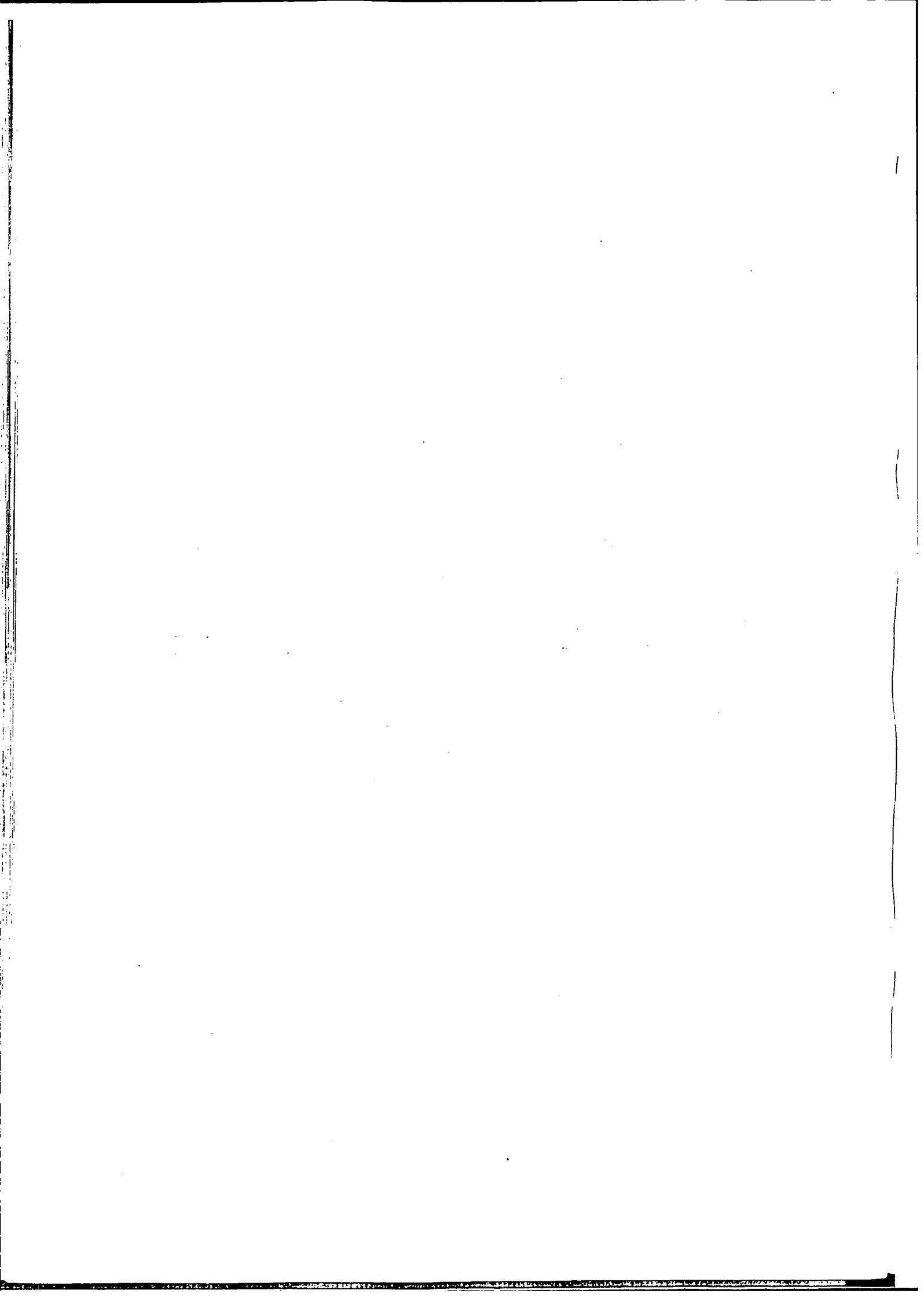
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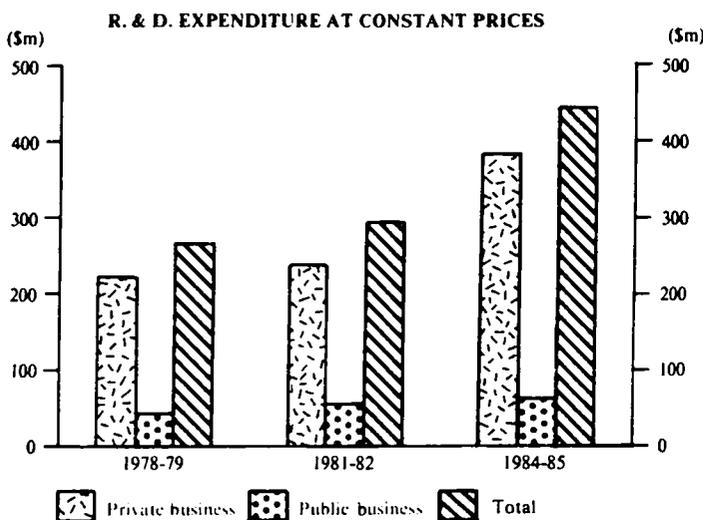
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MAIN FEATURES

The estimate of expenditure on Research and Experimental Development (R & D) carried out in Australia by business enterprises during 1984-85 has been revised upwards 9% on the preliminary estimate to \$721m at current prices. This represents a 90% increase in expenditure compared with 1981-82. At constant (average 1979-80) prices, R & D expenditure is estimated to have increased by 52% over this period.

Expenditure by private business enterprises was \$634m at current prices and by public business enterprises, \$87m at current prices. At constant (average 1979-80) prices, compared with 1981-82, these represent increases of 61% and 10% respectively.



Human resources devoted to R & D carried out in Australia by business enterprises during 1984-85 were 12,194 person years. This represents a 43% increase compared with 1981-82.

Payments for technical know-how by business enterprises in Australia in 1984-85 were \$163m (an increase of 20% compared with 1981-82). Receipts for technical know-how by business enterprises in Australia in 1984-85 were \$36m (an increase of 112% compared with 1981-82). 1984-85 statistics have been revised upwards by 25% and 24% respectively since the preliminary publication.

Software development is now included under the OECD definition of R & D. In 1984-85 this totalled \$61m, and is a partial explanation of the increase in R & D since 1981-82.

1981-82 statistics in Tables 1, 2, 14, 15 and 16 incorporate revisions to ensure comparability with increased coverage for 1984-85.

EXPLANATORY NOTES

Introduction

This publication presents revised estimates to expenditure and human resources devoted to R & D carried out in Australia by private and public business enterprises during 1984-85. They replace the preliminary estimates published on 27 May 1986 (Catalogue 8105.0).

2. Comparable R & D statistics are produced for the General Government, Private Non-profit and Higher Education sectors (See paragraph 39).

Data sources

3. The 1984-85 statistics presented in this publication have been compiled from data collected from business enterprises in the Survey of Research and Experimental Development in respect of the year ended 30 June 1985. This survey was based on a complete enumeration of businesses identified by the ABS as *likely R & D performers*. The survey was conducted by mailed questionnaires and an 86 per cent response was obtained. Non-respondents were expected to be non-R & D performers.

4. The 1978-79 and 1981-82 statistics in this publication were derived from similar R & D surveys. A number of revisions have been made to the 1981-82 statistics since the previous issue. These revisions have been provided in Tables 1, 2, 14, 15 and 16. It is not possible to apply these revisions to the historical details provided in other tables. Consequently, comparisons of current and previous statistics in these tables may not be valid.

5. Statistics from other ABS surveys necessary to provide R & D intensity details and R & D details by various size classifications, as provided in previous publications, are not yet available. These details, and limited additional R & D statistics, will be available from the ABS when compiled.

6. In 1983-84 the ABS conducted a trial sample survey of business enterprises, the results of which may not be comparable with previous and 1984-85 statistics due to limited coverage and high standard errors.

Definitions

7. *Research and Experimental Development* is defined in accordance with the Organisation for Economic Cooperation and Development (OECD) standard as comprising '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 this stock of knowledge to devise new applications'.

8. R & D activity in the business context is systematic investigation or experimentation involving innovation or technical risk, the outcome of which is *new knowledge*, with or without a specific practical application or *new or improved* products, processes, materials, devices or services. R & D activity extends to modifications to existing products/processes. R & D activity ceases and pre-production begins when work is no longer experimental.

9. The definition of R & D was extended for the 1984-85 survey, in accordance with a change in OECD standards, to include research into and development (or substantial modification) of computer software such as applications software, new programming languages and new operating systems. R & D expenditure on software development in 1984-85 was \$60.8m.
10. For a more comprehensive interpretation of the definition of R & D activity, contact the ABS or refer to the OECD publication *The Measurement of Scientific and Technical Activities* ("Frascati Manual" 1980) OECD, Paris 1981.
11. *Intramural* R & D statistics presented in this publication refer to R & D activity *carried out* by a business enterprise on its *own* behalf or on behalf of other enterprises, institutions or individuals.
12. *Extramural* R & D statistics refer to R & D activity *funded* by a business enterprise but *carried out* by other enterprises, institutions or individuals.
13. *Technical Know-How (TKH)* is the specialised technical knowledge required to successfully produce a product or implement a process, etc. (e.g. patent licences, technical data and information, scientific, technical or engineering assistance) that increases technical knowledge and understanding in an enterprise. Payments are those made directly to the holders of TKH which is new to a business enterprise. They exclude non-monetary transfers, and costs incurred by an enterprise in obtaining TKH, such as overseas travel costs.
14. *Energy* R & D statistics refer to R & D activity directed towards the producing, storing, transmitting, utilising and conserving of energy.
15. *R & D expenditure* includes *capital* expenditure on the acquisition (less disposals) of fixed tangible assets such as land, buildings, vehicles, plant, machinery and equipment attributable to R & D activity; *current* expenditure on wages, salaries, materials, fuels, rent and leasing, repairs and maintenance, data processing etc. and the proportion of expenditure on general services and overheads which is attributable to R & D activity. Respondents were asked to report data on an accruals basis of accounting.
16. *Human resources* devoted to R & D *measures* the effort of researchers, technicians and other staff *directly* involved with R & D activity. Overhead staff (e.g. administrative and general services employees such as personnel officers, janitors, etc.) whose work *indirectly* supports R & D activity, are *excluded*.
17. *Researchers* are those involved with the conception and/or development of new products/processes. They include project managers, directors, scientists and engineers concerned with project content but exclude those concerned with administrative matters.
18. *Technicians* are those performing technical tasks in support of R & D activity, normally under the direction and supervision of a researcher. These tasks include performing experiments, maintaining and operating advanced equipment and computer programming.
19. *Other supporting staff* are those skilled and unskilled craftspersons, secretarial and clerical staff directly associated with R & D activity.
20. *Basic research* is experimental and theoretical work undertaken primarily to acquire new knowledge without a specific application in view. It consists of pure basic research and strategic basic research. *Pure* basic research is carried out without looking for long term benefits other than the advancement of knowledge. *Strategic* basic research is directed into specified broad areas in the expectation of useful discoveries. It provides the broad base of knowledge necessary for the solution of recognised practical problems. Details on these components are available from the ABS.
21. *Applied research* is original work undertaken in order to acquire new knowledge with a specific practical application in view. It is undertaken either to determine possible uses for the findings of basic research or to determine new methods of achieving some specific and pre-determined objectives.
22. *Experimental development* is systematic work, using existing knowledge gained from research and/or practical experience, for the purpose of creating new or improved products/processes.

Scope

23. The scope of this survey is all enterprises within the Business Enterprise sector of Australia.

24. The *Business Enterprise* sector includes all enterprises whose primary activity is the production of goods or services for sale to the general public at a price intended to cover at least the cost of production, and the private non-profit institutions mainly serving them.

25. The organisational unit for the collection of R & D statistics is the enterprise. An *enterprise* is defined broadly as the unit comprising all the operations in Australia of a single operating legal entity (e.g. company, partnership or sole proprietor).

26. The vast majority of enterprises in this sector are private businesses. The remainder are public business enterprises mainly engaged in trading or financial activities.

Coverage

27. The 1984-85 R & D survey comprised a complete enumeration of business enterprises identified by the ABS as *likely* to have:

- (a) carried out R & D activity; or
- (b) funded R & D activity to be carried out by other enterprises, institutions or individuals.

28. Within the scope of the survey, enterprises were included in the collection if they satisfied any of the following criteria:

- (a) Enterprises recorded in the ABS's central register of economic units as:
 - (i) public sector trading and financial enterprises; or
 - (ii) employing 140 persons or more; or
 - (iii) mainly engaged in (or with establishments engaged in) certain industries within Basic Chemicals (ASIC Group 275), Other Chemical Products (ASIC Group 276), Appliances and Electrical Equipment (ASIC Group 335), Industrial Machinery and Equipment (ASIC Group 336), Consultant Engineering or Technical Services n.e.c. (ASIC Class 6336), or Research and Scientific Institutions (ASIC Class 8461); or
 - (iv) having a research laboratory.
- (b) Enterprises which applied for grants from the Australian Industrial Research and Development Incentives Board (AIRDIB) in recent years.
- (c) Enterprises which, in previous R & D surveys, reported R & D activity, payments or receipts for TKH, or patent activity.
- (d) Enterprises identified from reports in newspapers, industrial journals, research compendia etc. as likely to have R & D activity.

29. An improvement on the 1981-82 survey coverage was the extension of criteria (a)(iii) above to include all enterprises mainly engaged in (or with establishments mainly engaged in) certain industries within ASIC Groups 275, 276, 335 and 336. The ABS is investigating enhancement of the above criteria, or the introduction of additional criteria, with the aim of further improving the coverage of the R & D survey. In the past this coverage has been calculated as accounting for very high percentages, usually greater than 97 per cent, of R & D activity.

30. Enterprises mainly engaged in agriculture, forestry, fishing and hunting (ie. industries in Division A of the *Australian Standard Industrial Classification (ASIC), 1983 edition*) are excluded from this publication, partly because of collection difficulties and partly because such enterprises are believed to have very low R & D activity (agricultural R & D activity is generally carried out by specialised research institutes not included in ASIC Division A).

Classification

31. The 1984-85 statistics in this publication are classified by the industry of the enterprise in accordance with the 1983 edition of the ASIC. The 1978-79 and 1981-82 statistics are classified in accordance with the 1978 edition of the ASIC. If the 1983 edition were used to classify the earlier statistics, only minor differences would occur.

32. Each enterprise is classified to the industry in which it mainly operates even though one or more of its component establishments (factories, shops, etc.) may be classified to other industries. For further comment see the *Australian Standard Industrial Classification, 1983 Volume 1 (1201.0)*

33. Tables 12 and 13 contain a classification of R & D expenditure by the industry of the product/process field towards which the R & D activity was directed. This involved asking each respondent to list the products/processes towards which its R & D activity was directed and apportion its total R & D expenditure. The ABS coded each product/process to the ASIC industry in which it would be mainly produced or performed. For example, an enterprise classified as being in mining may have performed R & D activity into a more efficient ore crusher. As the manufacture of ore crushers would be classified to ASIC Class 3369 then the R & D expenditure would also be classified to this Class.

34. Table 25 contains Energy R & D activity classified by energy objective code. The energy objective categories refer to the principal areas of national benefit rather than the immediate objectives of the researcher. For the purposes of this table energy objective codes have been grouped to accord with the International Energy Agency *standard energy technology areas*.

Constant price estimates

35. Estimates of total R & D expenditure are shown at both current and constant (average 1979-80) prices in Table 1. In concept, constant price estimates are measures from which direct effects of price change have been eliminated. Although expressed in monetary terms, the constant price measures shown vary only with changes in the underlying quantities of inputs purchased (including labour). In effect, quantities of broadly defined categories of inputs are weighted by their prices in the base year (1979-80). Because the measures relate to input quantities, they do not reflect changes in the efficiency with which labour, capital and other inputs are used.

36. The estimate of the labour cost component was obtained by multiplying, for each broad category of labour, the quantity (person years) of labour used in each period by the relevant average labour cost in the base year (1979-80). The non-labour cost components were estimated by deflating each by a composite price index of relevant materials or capital expenditure items. In revaluing R & D expenditure, extensive use has been made of price series used in deriving constant price national accounts estimates.

37. For a more comprehensive description of constant price concepts and estimation procedures see *Australian National Accounts: Concepts, Sources and Methods* (5216.0).

Reliability of statistics

38. The statistics contained in this publication should be interpreted with caution for the following reasons:

- (a) Many respondents had to make estimates because their accounts do not separately record data on R & D activity, receipts and payments for TKH or patent activity.
- (b) The OECD standard definition of R & D differs in some respects from what respondents may regard as R & D activity, particularly since the definition used by AIRDIB for the allocation of grants differs slightly from the survey definition.
- (c) The coverage of R & D is not complete. For further information see paragraphs 27-30.

Related publications

39. Users may also wish to refer to the following publications:

Research and Experimental Development, General Government and Private Non-profit Organisations, Australia, 1984-85 (8109.0) (To be released shortly)

Research and Experimental Development, Higher Education Organisations, Australia, 1984-85 Preliminary (8115.0)

Research and Experimental Development, Business Enterprises (Inter Year Survey), Australia, 1983-84 (8114.0)

Research and Experimental Development, All Sector Summary, Australia, 1981-82 (8112.0)

Foreign Control in Research and Experimental Development, Business Enterprises, Australia, 1984-85 (5330.0)
— (Expected to be released early 1987)

Science and Technology Statement 1985-86 Department of Science, Canberra, Australia, 1985

The Measurement of Scientific and Technical Activities ("Frascati Manual" 1980) OECD, Paris 1981.

40. Current publications produced by the ABS are listed in the *Catalogue of Publications, Australia* (1101.0). The ABS also issues, on Tuesdays and Fridays, a *Publications Advice* (1105.0) which lists publications to be released in the next few days. The Catalogue and Publications Advice are available from any ABS office.

Symbols and other usages

r figure or series revised since previous issue

n.e.c. not elsewhere classified

n.p. not available for separate publication (but included in totals where applicable)

n.a. not available

— nil or rounded to zero

41. Where figures have been rounded, discrepancies may occur between sums of the component items and totals.

Electronic services

42. VIATEL. Key *656# for selected current economic, social and demographic statistics.

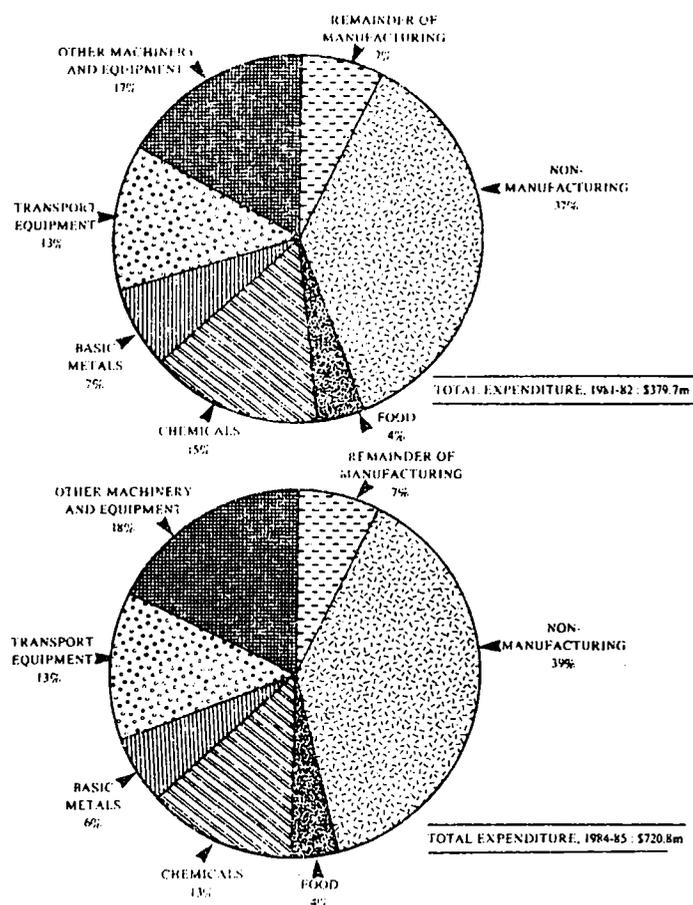
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Further information is available on (062) 52 5404.

**RESEARCH AND EXPERIMENTAL DEVELOPMENT
CARRIED OUT BY BUSINESS ENTERPRISES—AUSTRALIA, 1981-82 AND 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE(a)**



**TABLE 1. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a)
R & D EXPENDITURE AT CURRENT AND CONSTANT PRICES
(\$m)**

	1978-79	r 1981-82	1984-85
	AT CURRENT PRICES		
Private Sector	205.8	318.9	633.7
Public Sector	40.0	60.8	87.1
TOTAL BUSINESS ENTERPRISES	245.8	379.7	720.8
	AT CONSTANT (AVERAGE 1979-80) PRICES		
Private Sector	226.0	239.9	386.5
Public Sector	43.9	50.7	56.0
TOTAL BUSINESS ENTERPRISES	269.9	290.6	442.5

(a) Excludes enterprises in ASIC Division 'A'

TABLE 2. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA
 DETAILS OF RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE (b)

Industry of enterprise		Enterprises (number)			Expenditure (\$m)			Human resource effort (person years)		
		1978-79	1981-82	1984-85	1978-79	1981-82	1984-85	1978-79	1981-82	1984-85
ASIC Code	Description									
11-15	MINING (EXCLUDING SERVICES TO MINING)	17	23	30	9.7	22.6	28.9	315	381	283
	Manufacturing -									
21	Food, beverages and tobacco	84	72	89	16.1	14.1	27.8	545	390	594
23,24	Textiles, clothing and footwear	22	16	24	1.4	0.8	3.5	42	24	37
25	Wood, wood products and furniture	24	19	29	1.6	1.7	3.4	55	43	68
26	Paper, paper products, printing and publishing	14	12	22	4.1	5.3	6.4	144	125	139
27	Chemical, petroleum and coal products	118	128	179	35.2	57.3	91.4	1,381	1,307	1,565
28	Non-metallic mineral products	27	22	33	4.2	5.8	12.9	154	126	223
29	Basic metal products	35	27	28	20.9	27.1	44.8	776	672	659
31	Fabricated metal products	81	83	89	4.5	7.1	14.9	198	170	300
32	Transport equipment	47	54	64	15.6	48.1	93.9	604	1,087	1,536
334	Photographic, professional and scientific equipment	16	26	30	6.7	6.3	16.5	230	183	283
335	Appliances and electrical equipment	120	159	270	33.1	41.4	84.2	1,234	1,029	1,611
336	Industrial machinery and equipment	128	156	174	8.8	15.7	26.8	388	443	547
33	Total other machinery and equipment	264	341	474	48.6	63.4	127.6	1,851	1,655	2,440
34	Miscellaneous manufacturing	58	66	78	5.9	7.6	12.3	210	186	251
C	TOTAL MANUFACTURING	774	840	1,109	158.1	238.3	438.9	5,960	5,784	7,813
	Other industries -									
F	Wholesale and retail trade	112	106	183	11.4	12.5	33.0	390	296	563
63	Property and business services	169	206	444	14.2	20.2	77.9	472	499	1,272
8461	Research and scientific institutions	29	31	41	13.3	23.0	27.5	460	485	485
(c)	Other n.e.c.	85	72	121	39.1	63.1	114.7	1,030	1,086	1,778
16, D-L	TOTAL OTHER INDUSTRIES	395	415	789	78.0	118.9	253.1	2,352	2,368	4,098
	TOTAL ALL INDUSTRIES	1,186	1,278	1,928	245.8	379.7	720.8	8,626	8,533	12,194

(a) Excludes enterprises in ASIC Division 'A'

(b) 1984-85 data are classified by the 1983 edition of ASIC: 1978-79 and 1981-82 data are classified by the 1978 version of ASIC. If the 1983 version were used to classify 1978-79 and 1981-82 data, only minor differences would occur.

(c) ASIC codes 16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Resources devoted to R & D				R & D intensity	
ASIC Code	Description	Enterprises	Expenditure	Human resource effort	Researcher effort	Expenditure (b)	Human resources (c)
		number	\$'000	person years	person years	\$'000	%
Mining							
11	Metallic minerals	17	14,382	249	96	57.71	1.45
12-15	Non-metallic minerals	13	14,485	34	17	426.01	0.37
11-15	TOTAL MINING (EXCLUDING SERVICES TO MINING)	30	28,866	283	114	101.93	1.07
Manufacturing -							
211	Meat products	7	1,551	52	26	29.88	0.91
212	Milk products	16	3,573	78	48	45.81	0.58
213	Fruit and vegetable products	5	1,747	30	20	59.20	1.09
214,217	Margarine, oils, fats n.e.c. and other food products	34	12,152	248	135	49.04	1.73
215,216	Flour mill and cereal food products, bread, cakes and biscuits	13	5,255	110	64	47.99	0.52
218,219	Beverages, malt and tobacco products	14	3,497	78	37	45.06	0.78
21	Total food, beverages and tobacco	89	27,774	594	330	46.73	0.88
234	Textile fibres, yarns and woven fibres	5	64	1	1	45.71	0.17
235,24	Other textile products, clothing and footwear	19	3,478	36	19	96.60	0.46
23,24	Total textiles, clothing and footwear	24	3,542	37	20	94.70	0.43
25	Wood, wood products and furniture	29	3,412	68	34	49.96	0.71
263	Paper and paper products	11	5,772	121	54	47.70	0.83
264	Printing and allied industries	11	659	18	12	35.83	0.90
26	Total paper, paper products, printing and publishing	22	6,431	139	67	46.14	0.84
2753	Synthetic resins and rubber	16	8,777	151	80	58.05	4.04
2754, 2755	Organic and inorganic industrial chemicals n.e.c.	32	8,681	155	106	55.86	4.88
2762	Paints	30	12,518	295	153	42.51	5.08
2763	Pharmaceutical and veterinary products	42	31,527	439	216	71.75	5.76
(d)	Other chemical, petroleum and coal products	59	29,908	524	344	57.05	2.90
27	Total chemical, petroleum and coal products	179	91,411	1,565	900	58.42	4.07
287	Cement and concrete products	13	4,543	73	24	62.58	0.47
285,286, 288	Glass, clay and other non-metallic mineral products	20	8,346	150	72	55.60	0.51
28	Total non-metallic mineral products	33	12,889	223	96	57.87	0.50
294	Basic iron and steel	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
295,296	Basic non-ferrous metals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	28	44,771	659	360	67.97	0.88
314	Structural metal products	19	1,894	37	18	51.34	1.23
315	Sheet metal products	26	6,900	138	46	50.04	1.27
316	Other fabricated metal products	44	6,072	125	60	48.42	1.10
31	Total fabricated metal products	89	14,867	300	124	49.52	1.19
323	Motor vehicles and parts	45	81,210	1,289	500	63.00	2.26
324	Other transport equipment	19	12,738	247	98	51.61	2.24
32	Total transport equipment	64	93,948	1,536	598	61.17	2.26
334	Photographic, professional and scientific equipment	30	16,519	283	176	58.43	6.82

See footnotes at end of table.

TABLE 3. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
BROAD INDICATORS BY INDUSTRY OF ENTERPRISE - continued

Industry of enterprise		Resources devoted to R & D				R & D intensity	
ASIC Code	Description	Enterprises	Expenditure	Human resource effort	Researcher effort	Expenditure (b)	Human resources (c)
		number	\$'000	person years	person years	\$'000	%
3351, 3352	Radio and TV receivers, audio equipment and electronic equipment n.e.c.	155	53,978	911	388	59.23	6.29
3353	Refrigerators and household appliances	24	15,057	355	119	42.38	1.90
3354	Water heating systems	6	871	17	7	52.79	2.57
3355-3357	Cables, batteries and other electrical machinery and equipment n.e.c.	85	14,340	328	135	43.79	2.18
335	Total appliances and electrical equipment	270	84,245	1,611	649	52.31	3.29
3361	Agricultural machinery	31	6,557	152	55	43.08	3.01
3362	Construction machinery	3	253	6	5	46.00	3.40
3363	Materials handling equipment	14	1,384	30	19	46.13	0.52
3364-3369	Other industrial machinery and equipment n.e.c.	126	10,635	359	154	51.85	2.52
336	Total industrial machinery and equipment	174	26,829	547	232	49.04	2.16
33	Total other machinery and equipment	474	127,593	2,440	1,057	52.28	3.11
345,348	Leather, leather products and other manufacturing	21	4,657	101	63	46.02	3.60
346	Rubber products	11	2,201	46	22	48.05	1.01
347	Plastic and related products	46	5,422	104	53	52.29	1.10
34	Total miscellaneous manufacturing	78	12,280	251	138	48.98	1.50
C	TOTAL MANUFACTURING	1,109	438,917	7,813	3,722	56.18	1.74
Other industries -							
E	Construction	41	8,555	140	91	61.02	0.96
47	Wholesale trade	163	29,346	498	245	58.88	1.73
48	Retail trade	20	3,669	64	43	57.24	0.98
F	Total wholesale and retail trade	183	33,015	563	289	58.69	1.59
63	Property and business services	444	77,868	1,272	646	61.21	2.44
8461	Research and scientific institutions	41	27,494	485	261	56.67	62.45
(e)	Other n.e.c.	80	106,127	1,638	551	64.79	0.47
16,D-L	TOTAL OTHER INDUSTRIES	789	253,059	4,098	1,838	61.75	0.90
	TOTAL ALL INDUSTRIES	1,928	720,842	12,194	5,673	59.12	1.31
Private sector contribution to 'Total all industries' -							
	1984-85 (f)	1,882	633,695	10,852	5,152	58.39	1.74
	1981-82 (f)	1,212	285,686	6,913	3,054	41.33	n.a.

(a) Excludes enterprises in ASIC Division 'A'

(b) Expenditure on R & D per person year of R & D effort.

(c) Person-years of effort on R & D expressed as a percentage of the number of persons employed by those enterprises that carried out R & D.

(d) ASIC Classes 2751-2752, 2761, 2764-2780.

(e) ASIC codes 16,D,G,H,61-62,J,8141-8306,8462-8495,L.

(f) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY
(\$'000)

Industry of enterprise		Total	Type of expenditure			Type of activity		
ASIC Code	Description		Capital expenditure	Wages and salaries	Other current expenditure	Basic research	Applied research	Experimental development
11	Mining							
	Metallic minerals	14,382	255	9,193	4,934	n.p.	n.p.	8,162
12-15	Non-metallic minerals	14,485	6,092	1,943	6,448	n.p.	n.p.	8,336
11-15	TOTAL MINING (EXCLUDING SERVICES TO MINING)	28,866	6,348	11,136	11,382	1,190	11,179	16,498
	Manufacturing -							
211	Meat products	1,551	41	1,164	405	72	967	512
212	Milk products	3,573	778	1,778	1,017	164	1,274	2,135
213	Fruit and vegetable products	1,747	855	693	199	n.p.	n.p.	1,611
214,217	Margarine, oils, fats n.e.c. and other food products	12,152	1,132	6,939	4,082	360	3,634	8,159
215,216	Flour mill and cereal food products, bread, cakes and biscuits	5,255	885	2,990	1,380	n.p.	n.p.	3,004
218,219	Beverages, malt and tobacco products	3,497	622	2,453	422	271	2,076	1,150
21	Total food, beverages and tobacco	27,774	4,313	15,957	7,504	929	10,275	16,570
234	Textile fibres, yarns and woven fibres	64	n.p.	45	n.p.	n.p.	n.p.	54
235,24	Other textile products, clothing and footwear	3,478	n.p.	1,227	n.p.	n.p.	n.p.	2,402
23,24	Total textiles, clothing and footwear	3,542	1,207	1,272	1,063	100	986	2,456
25	Wood, wood products and furniture	3,412	319	1,929	1,164	55	1,153	2,204
263	Paper and paper products	5,772	1,262	3,685	825	n.p.	n.p.	3,327
264	Printing and allied industries	659	58	411	190	n.p.	n.p.	467
26	Total paper, paper products, printing and publishing	6,431	1,320	4,097	1,015	31	2,607	3,794
2753	Synthetic resins and rubber	8,777	2,127	4,933	1,717	-	966	7,811
2754, 2755	Organic and inorganic industrial chemicals n.e.c.	8,681	694	5,910	2,077	n.p.	n.p.	7,273
2762	Paints	12,518	521	9,826	2,172	n.p.	n.p.	7,610
2763	Pharmaceutical and veterinary products	31,527	6,230	13,363	11,994	1,172	10,247	20,108
(b)	Other chemical, petroleum and coal products	29,908	2,120	18,137	9,651	942	8,155	20,811
27	Total chemical, petroleum and coal products	91,411	11,691	52,109	27,611	2,214	25,584	63,613
287	Cement and concrete products	4,542	308	2,241	1,994	276	824	3,443
285,286, 288	Glass, clay and other non-metallic mineral products	8,346	939	4,620	2,786	192	2,347	5,807
28	Total non-metallic mineral products	12,889	1,248	6,862	4,780	468	3,171	9,250
294	Basic iron and steel	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
295,296	Basic non-ferrous metals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	44,771	8,388	24,936	11,448	2,175	23,280	19,316
314	Structural metal products	1,894	167	942	786	137	351	1,407
315	Sheet metal products	6,900	838	4,861	1,202	n.p.	n.p.	6,262
316	Other fabricated metal products	6,072	586	3,868	1,618	n.p.	n.p.	4,158
31	Total fabricated metal products	14,867	1,591	9,671	3,606	291	2,749	11,827
323	Motor vehicles and parts	81,210	2,113	46,432	32,666	304	4,602	76,304
324	Other transport equipment	12,738	802	9,161	2,775	16	2,483	10,239
32	Total transport equipment	93,948	2,914	55,592	35,441	320	7,085	86,543
334	Photographic, professional and scientific equipment	16,519	1,565	7,927	7,027	857	3,095	12,567

See footnotes at end of table.

TABLE 4. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED ON BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY TYPE OF EXPENDITURE AND TYPE OF ACTIVITY
(\$'000) - continued

Industry of enterprise		Total	Type of expenditure			Type of activity		
ASIC Code	Description		Capital expenditure	Wages and salaries	Other current expenditure	Basic research	Applied research	Experimental development
3351, 3352	Radio and TV receivers, audio equipment and electronic equipment n.e.c.	53,978	11,188	27,247	15,544	1,488	11,902	40,588
3353	Refrigerators and household appliances	15,057	n.p.	11,313	n.p.	n.p.	n.p.	13,698
3354	Water heating systems	871	n.p.	581	n.p.	n.p.	n.p.	711
3355-3357	Cables, batteries and other electrical machinery and equipment n.e.c.	14,340	1,697	9,253	3,390	299	4,145	9,896
335	Total appliances and electrical equipment	84,245	14,430	48,393	21,422	1,869	17,484	64,892
3361	Agricultural machinery	6,557	145	3,879	2,533	159	965	5,433
3362	Construction machinery	253	n.p.	105	n.p.	-	-	253
3363	Materials handling equipment	1,384	n.p.	914	n.p.	-	136	1,248
3364-3369	Other industrial machinery and equipment n.e.c.	18,635	3,468	10,220	4,947	198	4,536	13,901
336	Total industrial machinery and equipment	26,829	3,805	15,118	7,905	357	5,637	20,834
33	Total other machinery and equipment	127,593	19,801	71,438	36,354	3,083	26,217	98,294
345,348	Leather, leather products and other manufacturing	4,657	636	2,541	1,481	n.p.	n.p.	3,306
346	Rubber products	2,201	314	1,417	470	n.p.	n.p.	1,417
347	Plastic and related products	5,422	582	3,187	1,653	20	1,140	4,262
34	Total miscellaneous manufacturing	12,280	1,531	7,145	3,604	209	3,086	8,985
C	TOTAL MANUFACTURING	438,917	54,321	251,007	133,589	9,874	106,193	322,851
E	Other industries -							
47	Construction	8,555	704	4,685	3,158	8	5,419	3,129
48	Wholesale trade	29,346	4,402	15,532	9,412	n.p.	n.p.	23,458
48	Retail trade	3,669	247	2,669	754	n.p.	n.p.	3,376
F	Total wholesale and retail trade	33,015	4,649	18,201	10,165	310	5,872	26,833
63	Property and business services	77,868	14,960	39,986	22,922	2,867	27,348	47,653
8461	Research and scientific institutions	27,494	2,538	14,660	10,296	1,452	14,270	11,773
(c)	Other n.e.c.	106,127	16,176	61,565	28,385	1,394	39,629	65,104
16,D-L	TOTAL OTHER INDUSTRIES	253,059	39,027	139,097	74,927	6,031	92,536	154,492
	TOTAL ALL INDUSTRIES	720,842	99,696	401,241	219,898	17,095	209,908	493,840
	Private sector contribution to 'Total all industries' -							
	1984-85 (d)	633,695	87,283	351,311	195,093	15,296	171,652	446,746
	1981-82 (d)	285,686	35,336	177,259	73,093	13,983	89,696	182,009

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Classes 2751-2752,2761,2764-2780.

(c) ASIC Codes 16,D,G,H,61-62,J,8141-8306,8462-8495,L.

(d) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 5. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY SOURCE OF FUNDS
(\$'000)

Industry of enterprise		Source of funds							
ASIC Code	Description	Total	Own funds	AIRDIB grants (b)	Other Common-wealth Government	State and Local Government	Other business enterprises	Private non-profit and other Australian (c)	Overseas
Manufacturing -									
21	Food, beverages and tobacco	27,774	25,552	1,078	586	-	-	n.p.	n.p.
23,24	Textiles, clothing and footwear	3,542	3,277	259	n.p.	-	n.p.	-	-
25	Wood, wood products and furniture	3,412	2,957	361	n.p.	-	n.p.	n.p.	-
26	Paper, paper products, printing and publishing	6,431	6,173	148	n.p.	-	n.p.	-	-
27	Chemical, petroleum and coal products	91,411	83,610	2,719	3,251	-	1,258	n.p.	n.p.
28	Non-metallic mineral products	12,889	12,286	433	n.p.	-	n.p.	-	-
29	Basic metal products	44,771	40,465	1,281	n.p.	n.p.	1,475	-	-
31	Fabricated metal products	14,867	13,551	819	270	n.p.	-	n.p.	-
32	Transport equipment	93,948	84,191	1,652	n.p.	-	1,412	n.p.	-
334	Photographic, professional and scientific equipment	16,519	13,201	3,116	n.p.	-	-	n.p.	-
335	Appliances and electrical equipment	84,245	63,904	10,010	n.p.	97	8,134	764	n.p.
336	Industrial machinery and equipment	26,829	21,629	4,551	275	-	158	n.p.	n.p.
33	Total other machinery and equipment	127,593	98,733	17,676	1,620	97	8,292	774	403
34	Miscellaneous manufacturing	12,280	10,454	1,742	85	-	-	-	-
C	TOTAL MANUFACTURING	438,917	381,249	28,167	14,172	223	12,565	1,428	1,114
Other industries -									
F	Wholesale and retail trade	33,015	26,109	2,956	219	n.p.	595	413	n.p.
63	Property and business services	77,868	50,886	6,150	2,242	2,552	9,670	139	6,229
8461	Research and scientific institutions	27,494	4,729	1,545	5,028	255	11,075	2,189	2,675
(d)	Other n.e.c.	143,548	135,019	1,533	3,345	n.p.	3,275	-	n.p.
16, D-L	TOTAL OTHER INDUSTRIES	253,059	190,491	11,609	8,809	3,142	24,609	2,741	11,658
	TOTAL ALL INDUSTRIES	720,842	597,993	40,350	25,005	3,374	37,179	4,169	12,772
Private sector contribution to 'Total all industries' -									
	1984-85 (e)	633,695	516,565	40,083	20,486	3,064	36,586	4,169	12,741
	1981-82 (e)	285,686	228,196	18,183	11,368	400	19,961	1,194	6,386

(a) Excludes enterprises in ASIC Division 'A'.

(b) Australian Industrial Research and Development Incentives Board.

(c) Includes Higher Education Sector.

(d) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

(e) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 6. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY TYPE OF EMPLOYEE AND EMPLOYMENT SIZE
(person-years)

Industry of enterprise		Total	Type of employee			Employment size (b) (persons)	
			Researchers	Technicians	Other supporting staff	Less than 200	200 or more
ASIC Code	Description						
	Mining						
11	Metallic minerals	249	96	121	32	10	239
12-15	Non-metallic minerals	34	17	11	5	10	24
11-15	TOTAL MINING (EXCLUDING SERVICES TO MINING)	283	114	132	37	20	263
	Manufacturing -						
211	Meat products	52	26	15	10	17	35
212	Milk products	78	48	18	12	11	67
213	Fruit and vegetable products	30	20	4	6	n.p.	n.p.
214,217	Margarine, oils, fats n.e.c. and other food products	248	135	64	49	58	190
215,216	Flour mill and cereal food products, bread, cakes and biscuits	110	64	30	15	n.p.	n.p.
218,219	Beverages, malt and tobacco products	78	37	31	10	7	71
21	Total food, beverages and tobacco	594	330	163	101	97	498
234	Textile fibres, yarns and woven fibres	1	1	-	-	1	-
235,24	Other textile products, clothing and footwear	36	19	11	6	19	17
23,24	Total textiles, clothing and footwear	37	20	11	7	20	18
25	Wood, wood products and furniture	68	34	24	11	28	40
263	Paper and paper products	121	54	47	20	n.p.	n.p.
264	Printing and allied industries	18	12	3	4	n.p.	n.p.
26	Total paper, paper products, printing and publishing	139	67	50	23	14	125
2753	Synthetic resins and rubber	151	80	43	28	35	116
2754, 2755	Organic and inorganic industrial chemicals n.e.c.	155	106	36	14	52	103
2762	Paints	295	153	121	20	63	231
2763	Pharmaceutical and veterinary products	439	216	151	73	97	342
(c)	Other chemical, petroleum and coal products	524	344	139	41	90	434
27	Total chemical, petroleum and coal products	1,565	900	489	176	338	1,227
287	Cement and concrete products	73	24	31	18	19	54
285,286, 288	Glass, clay and other non-metallic mineral products	150	72	48	31	9	141
28	Total non-metallic mineral products	223	96	79	48	28	194
294	Basic iron and steel	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
295,296	Basic non-ferrous metals	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Total basic metal products	659	360	175	124	10	649
314	Structural metal products	37	18	10	8	n.p.	n.p.
315	Sheet metal products	138	46	52	40	22	116
316	Other fabricated metal products	125	60	48	18	n.p.	n.p.
31	Total fabricated metal products	300	124	110	66	94	206
323	Motor vehicles and parts	1,289	500	652	137	41	1,248
324	Other transport equipment	247	98	71	78	20	227
32	Total transport equipment	1,536	598	723	215	61	1,475
334	Photographic, professional and scientific equipment	283	176	73	34	110	173

See footnotes at end of table.

TABLE 6. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY TYPE OF EMPLOYEE AND EMPLOYMENT SIZE
(person-years) - continued

Industry of enterprise		Total	Type of employee			Employment size (b) (persons)	
ASIC Code	Description		Researchers	Technicians	Other supporting staff	Less than 200	200 or more
3351, 3352	Radio and TV receivers, audio equipment and electronic equipment n.e.c.	911	288	424	100	461	450
3353	Refrigerators and household appliances	355	119	155	81	n.p.	n.p.
3354	Water heating systems	17	7	5	4	n.p.	n.p.
3355-3357	Cables, batteries and other electrical machinery and equipment n.e.c.	328	135	141	51	155	173
335	Total appliances and electrical equipment	1,611	649	725	236	661	950
3361	Agricultural machinery	152	55	50	48	51	101
3362	Construction machinery	6	5	n.p.	n.p.	n.p.	n.p.
3363	Materials handling equipment	30	19	n.p.	n.p.	n.p.	n.p.
3364-3369	Other industrial machinery and equipment n.e.c.	359	154	119	87	223	137
336	Total industrial machinery and equipment	547	232	174	141	307	240
33	Total other machinery and equipment	2,440	1,057	972	411	1,078	1,363
345,348	Leather, leather products and other manufacturing	101	63	24	14	40	61
346	Rubber products	46	22	12	12	18	26
347	Plastic and related products	104	53	32	18	47	57
34	Total miscellaneous manufacturing	251	138	69	44	105	146
C	TOTAL MANUFACTURING	7,813	3,722	2,863	1,227	1,872	5,940
Other industries -							
E	Construction	140	91	28	21	n.p.	n.p.
47	Wholesale trade	498	245	174	79	262	236
48	Retail trade	64	43	13	8	20	45
F	Total wholesale and retail trade	563	289	187	87	282	281
63	Property and business services	1,272	646	406	221	737	535
8461	Research and scientific institutions	485	261	127	97	n.p.	n.p.
(d)	Other n.e.c.	1,638	551	757	330	103	1,535
16,D-L	TOTAL OTHER INDUSTRIES	4,098	1,838	1,506	755	1,629	2,469
	TOTAL ALL INDUSTRIES	12,194	5,673	4,501	2,020	3,522	8,672
Private sector contribution to 'Total all industries' -							
	1984-85 (e)	10,852	5,152	3,987	1,713	3,493	7,359
	1981-82 (e)	6,913	3,053	2,565	1,295	n.a.	n.a.

(a) Excludes enterprises in ASIC Division 'A'

(b) For further information see also Table 10.

(c) ASIC Classes 2751-2752, 2761, 2764-2780.

(d) ASIC Codes 16,D,G,H, 61-62, J, 8141-8306, 8462-8495, L.

(e) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 7. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY LOCATION (b)
(person-years)

ASIC Code	Industry of enterprise Description	Total	Location						
			N.S.W.	Vic.	Qld.	W.A.	Other Australian states	Overseas	
	Manufacturing -								
21	Food, beverages and tobacco	330	127	152	35	5	11	-	
23,24	Textiles, clothing and footwear	20	8	10	n.p.	-	n.p.	-	
25	Wood, wood products and furniture	34	17	3	n.p.	7	n.p.	-	
26	Paper, paper products, printing and publishing	67	8	32	n.p.	n.p.	23	-	
27	Chemical, petroleum and coal products	900	309	512	23	15	38	4	
28	Non-metallic mineral products	96	39	50	3	3	2	-	
29	Basic metal products	360	167	127	12	25	29	-	
31	Fabricated metal products	124	60	43	3	n.p.	n.p.	-	
32	Transport equipment	598	77	434	16	n.p.	n.p.	-	
334	Photographic, professional and scientific equipment	176	90	81	5	-	-	-	
335	Appliances and electrical equipment	649	310	188	29	29	n.p.	n.p.	
336	Industrial machinery and equipment	232	84	87	22	17	n.p.	n.p.	
33	Total other machinery and equipment	1,057	484	355	55	46	108	8	
34	Miscellaneous manufacturing	138	47	37	6	5	43	-	
C	TOTAL MANUFACTURING	3,722	1,342	1,754	161	107	345	14	
	Other industries -								
F	Wholesale and retail trade	289	110	91	36	n.p.	33	n.p.	
63	Property and business services	646	258	162	45	83	75	24	
8461	Research and scientific institutions	261	142	20	62	n.p.	34	n.p.	
(c)	Other n.e.c.	755	196	379	92	39	48	1	
16, D-L	TOTAL OTHER INDUSTRIES	1,838	693	647	161	132	179	26	
	TOTAL ALL INDUSTRIES	5,673	2,048	2,405	396	249	536	40	
	Private sector contribution to 'Total all industries' -								
	1984-85 (d)	5,152	1,964	2,023	381	229	516	40	
	1981-82 (d)	3,053	1,206	1,087	287	n.a.	n.a.	n.a.	

(a) Excludes enterprises in ASIC Division 'A'

(b) For further information see Table 11.

(c) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

(d) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 8. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY R & D EXPENDITURE SIZE

Industry of enterprise		R & D expenditure size (\$'000)								
		Total	Less than 20		20 to 49		50 to 499		500 or more	
ASIC Code	Description	Enter- prises	Expend- iture	Enter- prises	Expend- iture	Enter- prises	Expend- iture	Enter- prises	Expend- iture	
		\$'000	number	\$'000	number	\$'000	number	\$'000	number	\$'000
	Manufacturing -									
21	Food, beverages and tobacco	27,774	8	104	14	536	49	8,990	18	18,144
23,24	Textiles, clothing and footwear	3,542	n.p.	n.p.	4	148	12	1,883	n.p.	n.p.
25	Wood, wood products and furniture	3,412	n.p.	n.p.	5	168	16	2,517	n.p.	n.p.
26	Paper, paper products, printing and publishing	6,431	3	32	8	274	6	774	5	5,351
27	Chemical, petroleum and coal products	91,411	26	270	33	1,180	84	13,242	36	76,719
28	Non-metallic mineral products	12,889	3	35	4	120	20	2,447	6	10,287
29	Basic metal products	44,771	3	37	5	138	11	2,086	9	42,510
31	Fabricated metal products	14,867	16	138	25	832	43	7,058	5	6,839
32	Transport equipment	93,948	7	54	11	378	31	4,156	15	89,360
334	Photographic, professional and scientific equipment	16,519	4	42	7	204	13	1,745	6	14,528
335	Appliances and electrical equipment	84,245	42	460	56	1,819	144	22,524	28	59,442
336	Industrial machinery and equipment	26,829	32	383	41	1,437	89	12,333	12	12,676
33	Total other machinery and equipment	127,593	78	885	104	3,460	246	36,602	46	86,646
34	Miscellaneous manufacturing	12,280	17	175	19	556	38	5,604	4	5,946
C	TOTAL MANUFACTURING	438,917	175	1,845	232	7,790	556	85,357	146	343,925
	Other industries -									
F	Wholesale and retail trade	33,015	38	366	36	1,213	91	12,175	18	19,261
63	Property and business services	77,868	173	1,471	112	3,513	130	17,046	29	55,838
8461	Research and scientific institutions	27,494	4	49	6	199	20	3,831	11	23,416
(b)	Other n.e.c.	143,548	21	192	27	902	73	13,354	30	129,100
16, D-L	TOTAL OTHER INDUSTRIES	253,059	235	2,069	177	5,698	293	41,950	84	203,342
	TOTAL ALL INDUSTRIES	720,842	411	3,923	413	13,616	870	131,764	234	571,539
	Private sector contribution to 'Total all industries' -									
	1984-85	633,695	406	3,857	407	13,440	851	127,112	218	489,286
	1981-82	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Codes 11-16,D,E,G-H,61-62,J,8141-8306,8462-8495,L.

TABLE 9. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE
(\$'000)

ASIC Code	Industry of enterprise Description	Total	Enterprise employment size (persons)						
			Less than 10	10 to 19	20 to 99	100 to 199	200 to 499	500 to 999	1000 or more
	Manufacturing -								
21	Food, beverages and tobacco	27,774	305	141	1,442	1,751	3,930	6,550	13,655
23,24	Textiles, clothing and footwear	3,542	-	244	1,751	87	873	n.p.	n.p.
25	Wood, wood products and furniture	3,412	49	219	289	376	1,169	n.p.	n.p.
26	Paper, paper products, printing and publishing	6,431	69	n.p.	n.p.	n.p.	162	1,227	4,608
27	Chemical, petroleum and coal products	91,411	1,798	1,594	6,857	8,658	24,371	13,697	34,435
28	Non-metallic mineral products	12,889	n.p.	n.p.	409	272	991	n.p.	9,564
29	Basic metal products	44,771	n.p.	n.p.	n.p.	n.p.	1,136	1,498	41,650
31	Fabricated metal products	14,867	377	575	2,437	775	2,100	2,240	6,363
32	Transport equipment	93,948	306	579	1,502	324	2,289	2,607	86,341
334	Photographic, professional and scientific equipment	16,519	335	475	2,944	2,323	n.p.	-	n.p.
335	Appliances and electrical equipment	84,245	6,449	4,480	13,841	7,888	7,087	3,481	41,019
336	Industrial machinery and equipment	26,829	1,449	3,352	6,992	3,095	n.p.	3,137	n.p.
33	Total other machinery and equipment	127,593	8,233	8,307	23,777	13,306	19,868	6,618	47,484
34	Miscellaneous manufacturing	12,280	309	119	3,441	713	1,015	3,642	3,041
C	TOTAL MANUFACTURING	438,917	11,598	12,680	42,275	26,590	57,903	39,940	247,931
	Other industries -								
F	Wholesale and retail trade	33,015	2,950	3,475	8,219	n.p.	7,953	n.p.	5,454
63	Property and business services	77,868	12,144	8,115	14,698	7,210	8,395	12,488	14,818
8461	Research and scientific institutions	27,494	3,349	1,317	14,713	n.p.	-	n.p.	647
(b)	Other n.e.c.	143,548	1,207	4,143	2,379	1,864	6,203	8,435	119,317
16, D-L	TOTAL OTHER INDUSTRIES	253,059	19,641	16,478	39,534	17,263	20,214	23,579	116,351
	TOTAL ALL INDUSTRIES	720,842	31,248	29,729	82,932	44,473	80,454	64,486	387,520
	Private sector contribution to 'Total all industries' -								
	1984-85	633,695	31,248	29,485	82,089	43,524	79,299	64,406	303,644
	1981-82	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Codes 11-16,D,E,G-H,61-62,J,8141-8306,8462-8495,L.

TABLE 10. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
HUMAN RESOURCES DEVOTED TO R & D BY INDUSTRY OF ENTERPRISE BY ENTERPRISE EMPLOYMENT SIZE (b)
(person-years)

Industry of enterprise		Total	Enterprise employment size (persons)						
ASIC Code	Description		Less than 10	10 to 19	20 to 99	100 to 199	200 to 499	500 to 999	1000 or more
Manufacturing -									
21	Food, beverages and tobacco	594	8	4	38	46	69	155	275
23,24	Textiles, clothing and footwear	37	-	4	14	2	14	n.p.	n.p.
25	Wood, wood products and furniture	68	2	5	7	15	22	n.p.	n.p.
26	Paper, paper products, printing and publishing	139	2	n.p.	n.p.	n.p.	4	26	96
27	Chemical, petroleum and coal products	1,565	40	37	144	117	413	207	606
28	Non-metallic mineral products	223	n.p.	n.p.	8	8	19	20	155
29	Basic metal products	659	n.p.	n.p.	n.p.	n.p.	18	14	616
31	Fabricated metal products	300	11	13	49	21	48	33	125
32	Transport equipment	1,536	8	13	35	5	57	65	1,353
334	Photographic, professional and scientific equipment	283	11	10	47	42	n.p.	-	n.p.
335	Appliances and electrical equipment	1,611	127	166	281	147	132	86	732
336	Industrial machinery and equipment	547	33	80	122	71	n.p.	63	n.p.
33	Total other machinery and equipment	2,440	171	196	451	260	388	148	827
34	Miscellaneous manufacturing	251	7	3	81	14	20	71	55
C	TOTAL MANUFACTURING	7,813	253	287	838	495	1,071	752	4,117
Other industries -									
F	Wholesale and retail trade	563	64	68	132	n.p.	147	n.p.	98
63	Property and business services	1,272	272	107	224	135	126	196	213
8461	Research and scientific institutions	485	60	39	227	n.p.	-	n.p.	14
(c)	Other n.e.c.	2,061	23	58	46	32	106	97	1,699
16, D-L	TOTAL OTHER INDUSTRIES	4,098	418	263	623	325	340	320	1,810
	TOTAL ALL INDUSTRIES	12,194	671	560	1,481	824	1,449	1,082	6,126
Private sector contribution to 'Total all industries' -									
	1984-85	10,852	671	552	1,463	807	1,435	1,080	4,844
	1981-82	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) Excludes enterprises in ASIC Division 'A'.
(b) For further information see Table 6.
(c) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 11. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
RESEARCHER EFFORT BY INDUSTRY OF ENTERPRISE BY LOCATION (b)
(person years)

Industry of enterprise		Total	Location								
ASIC Code	Description		N.S.W.	Vic.	Qld.	W.A.	S.A.	Tas.	N.T.	A.C.T.	Overseas
C	Manufacturing	3,722	1,342	1,754	161	107	255	64	2	25	14
B,D-L	Mining and other industries	1,951	706	651	235	143	138	29	3	21	26
	TOTAL ALL INDUSTRIES	5,673	2,048	2,405	396	249	393	93	5	45	40

(a) Excludes enterprises in ASIC Division 'A'.
(b) For further information see Table 7.

TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b)

Industry of product field (c) ASIC Code Description		1981-82 (d)		1984-85 (d)	
		Enterprises (e)	R & D expenditure	Enterprises (e)	R & D expenditure
		number	\$'000	number	\$'000
012,018	Agriculture, forestry, fishing and hunting Poultry, cereal grains, sheep, cattle and pigs	4	552	11	2,336
013-014 019-04	Other agriculture, forestry, fishing and hunting	8	766	19	2,055
A	TOTAL AGRICULTURE, FORESTRY, FISHING AND HUNTING	12	1,317	27	4,390
	Mining				
11	Metallic minerals	17	16,311	20	17,096
12-15	Non-metallic minerals	18	18,690	34	24,595
11-15	TOTAL MINING (EXCLUDING SERVICES TO MINING)	34	35,002	54	41,691
	Manufacturing -				
211	Meat products	8	533	7	1,060
212	Milk products	18	2,322	19	2,855
213	Fruit and vegetable products	16	1,254	11	1,686
214,217	Margarine, oils, fats n.e.c. and other food products	40	5,478	62	12,294
215,216	Flour mill and cereal food products, bread, cakes and biscuits	22	4,612	27	5,908
218,219	Beverages, malt and tobacco products	16	2,053	17	4,802
21	Total food, beverages and tobacco	90	16,311	109	28,605
234	Textile fibres, yarns and woven fibres	n.p.	n.p.	6	720
235,24	Other textile products, clothing and footwear	n.p.	n.p.	19	1,899
23,24	Total textiles, clothing and footwear	16	1,064	24	2,604
25	Wood, wood products and furniture	30	2,609	36	3,485
263	Paper and paper products	n.p.	n.p.	17	6,287
264	Printing and allied industries	n.p.	n.p.	6	1,838
26	Total paper, paper products, printing and publishing	11	5,520	23	8,125
2751	Chemical fertilizers	12	1,813	7	1,154
2753	Synthetic resins and rubber	24	8,910	45	9,184
2754	Organic industrial chemicals n.e.c.	21	2,284	48	9,230
2755	Inorganic industrial chemicals n.e.c.	28	6,131	22	5,735
2762	Paints	29	6,613	54	12,950
2763	(Veterinary products	24	4,175	25	14,103
	(Pharmaceutical products	23	9,698	49	22,380
2764	Pesticides	16	6,229	30	9,506
2765	Soap and other detergents	25	2,265	28	3,140
2766	Cosmetics and toilet preparations	9	434	16	2,349
2767	Inks	7	734	6	1,482
2752,2761, 2768	Industrial gases, ammunition and other chemical products	39	5,087	47	9,444
275,276	Total basic chemicals and other chemical products	186	54,374	273	100,657
277,278	Petroleum refining, petroleum and coal products n.e.c.	25	5,832	26	2,538
27	Total chemical, petroleum and coal products	195	60,207	289	103,195
285	Glass and glass products	4	257	6	973
286	Clay products and refractories	19	2,438	18	4,712
287	Cement and concrete products	23	1,820	24	4,055
288	Other non-metallic mineral products	12	1,628	22	3,762
28	Total non-metallic mineral products	52	6,142	64	13,501
294	Basic iron and steel	29	13,579	43	20,815
295,296	Basic non-ferrous metals	36	10,610	36	14,245
29	Total basic metal products	63	24,189	76	35,059

See footnotes at end of table.

TABLE 12. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b) - continued

ASIC Code	Industry of product field (c) Description	1981-82 (d)		1984-85 (d)	
		Enterprises (e) number	R & D expenditure \$'000	Enterprises (e) number	R & D expenditure \$'000
314	Structural metal products	32	2,933	44	5,388
315	Sheet metal products	27	964	30	2,586
316	Other fabricated metal products	54	5,342	98	8,768
31	Total fabricated metal products	105	7,238	156	16,742
323	Motor vehicles and parts	70	32,717	75	87,522
3241,3242	Ships and boats	18	534	18	5,317
3243	Railway rolling stock and locomotives	8	1,478	9	4,400
3244	Aircraft	n.p.	n.p.	n.p.	n.p.
3245	Transport equipment n.e.c.	n.p.	n.p.	n.p.	n.p.
324	Total other transport equipment	36	3,704	38	16,180
32	Total transport equipment	103	36,422	112	103,702
3341,3342	Photographic and optical goods and photographic film processing	n.a.	n.a.	13	6,836
3343	(Medical and surgical equipment (excl. veterinary equipment)	n.a.	n.a.	49	12,772
334	(Other measuring, professional and scientific equipment	n.a.	n.a.	72	8,267
334	Photographic, professional and scientific equipment	79	11,439	131	21,039
3351	Radio and TV receivers and audio equipment	11	665	19	1,551
3352	(Telecommunications and broadcasting equipment	36	55,114	82	90,392
3352	(Other electronic equipment	84	8,099	188	18,763
3352	(Computer hardware	62	7,852	120	17,912
3352	(Computer software	n.a.	n.a.	241	60,755
3353	Refrigerators and household appliances	35	3,858	54	12,886
3354	Water heating systems	27	2,304	23	2,757
3355-3357	Cables, batteries and other electrical machinery and equipment n.e.c.	90	8,250	115	12,611
335	Total appliances and electrical equipment	306	86,143	683	217,625
3361	Agricultural machinery	66	6,322	74	8,709
3362	Construction machinery	18	848	23	1,195
3363	Materials handling equipment	31	1,483	59	4,943
3364	Wood and metal working machinery	29	2,549	31	2,162
3365	Pumps and compressors	23	1,512	33	4,111
3366	Commercial space heating and cooling equipment	8	396	11	2,278
3367	Dies, saw blades and machine tool accessories	5	64	10	1,445
3368	Food processing equipment	19	1,417	40	6,426
3369	Industrial machinery & equipment n.e.c.	169	12,081	236	23,987
336	Total industrial machinery and equipment	323	26,672	455	55,255
33	Total other machinery and equipment	640	124,254	1,142	300,755
345	Leather and leather products	7	165	5	160
346	Rubber products	15	901	13	2,079
347	Plastic and related products	74	4,389	85	8,196
348	Other manufacturing	21	1,207	41	7,342
34	Total miscellaneous manufacturing	109	6,662	140	17,777
C	TOTAL MANUFACTURING	1,169	290,617	1,795	633,550
16	Other industries - Services to mining	12	1,516	9	416
E	Construction	12	357	30	4,243
D,F-L	Other n.e.c.	50	11,697	120	36,552
16,D-L	TOTAL OTHER INDUSTRIES	73	13,570	150	41,211
	TOTAL ALL INDUSTRIES (f)	1,246	340,507	1,928	720,842

(a) Excludes enterprises in ASIC Division 'A'.

(b) The industry of product (or process) field towards which the R & D activity was directed. For further explanation see paragraph 33 of the Explanatory Notes.

(c) 1984-85 data are classified by the 1983 edition of ASIC: 1981-82 data are classified by the 1978 version of ASIC. If the 1983 version were used to classify 1981-82 data, only minor differences would occur.

(d) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

(e) Where the R & D performed by an enterprise was directed towards more than one product, that enterprise is counted in each of the industries to which its products are coded. Therefore, the enterprise counts shown in this table cannot be summed to aggregates for combinations of industries.

(f) ASIC Divisions A-L.

TABLE 13. RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
R & D EXPENDITURE BY INDUSTRY OF PRODUCT FIELD (b) BY LOCATION
(\$'000)

ASIC Code	Industry of product field Description	Total	Location						
			N.S.W.	Vic.	Qld.	W.A.	S.A.	Other Austra- lian states	Overseas
11-15	MINING (EXCLUDING SERVICES TO MINING)	41,691	9,962	15,967	6,610	7,707	n.p.	n.p.	n.p.
	Manufacturing -								
21	Food, beverages and tobacco	28,605	12,685	10,727	2,928	399	1,550	315	-
23-24	Textiles, clothing and footwear	2,604	1,227	1,145	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	3,485	1,545	945	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	8,125	1,389	3,794	49	-	1,009	1,884	-
2763	Pharmaceuticals and veterinary products	36,483	17,435	15,160	2,125	445	1,099	n.p.	n.p.
(c)	Chemicals, petroleum and coal products	66,712	23,262	35,610	2,917	1,441	1,902	n.p.	n.p.
28	Non-metallic mineral products	13,501	6,069	6,292	347	411	330	n.p.	n.p.
29	Basic metal products	35,059	14,494	11,438	4,871	550	1,218	2,489	-
31	Fabricated metal products	16,742	9,119	5,014	1,618	63	782	n.p.	n.p.
32	Transport equipment	103,702	16,944	70,453	1,670	5,642	7,382	n.p.	n.p.
334	Photographic, professional and scientific equipment	27,875	13,022	10,821	265	158	2,857	n.p.	n.p.
335	Appliances and electrical equipment	217,625	82,860	98,105	7,157	6,693	15,695	6,756	359
336	Industrial machinery and equipment	55,255	14,738	20,494	8,748	4,588	5,590	n.p.	n.p.
33	Total other machinery and equipment	300,755	110,620	129,420	16,169	11,439	24,142	8,599	366
34	Miscellaneous manufacturing	17,777	3,892	6,154	947	283	6,415	n.p.	n.p.
C	TOTAL MANUFACTURING	633,550	218,682	296,151	34,105	21,056	46,201	15,375	1,980
A,16, D-L	AGRICULTURE AND OTHER INDUSTRIES	45,602	25,825	10,048	3,666	2,591	n.p.	n.p.	n.p.
	TOTAL ALL INDUSTRIES (d)	720,842	254,469	322,165	44,381	31,355	48,069	18,374	2,030
	Private sector contribution to 'Total all industries' -								
	1984-85	633,695	239,080	259,201	43,373	29,038	42,637	18,336	2,030
	1981-82	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

(a) Excludes enterprises in ASIC Division 'A'.

(b) The industry of product (or process) field towards which the R & D activity was directed.
For further explanation see paragraph 33 of the Explanatory Notes.

(c) ASIC Subdivision 27 excluding ASIC Class 2763.

(d) ASIC Divisions A-L.

TABLE 14. EXTRAMURAL R & D EXPENDITURE (a) BY BUSINESS ENTERPRISES (b), AUSTRALIA, 1984-85
PAYMENTS BY INDUSTRY OF ENTERPRISE MAKING PAYMENT BY LOCATION OF RECIPIENT

Industry of enterprise making payment		Location of recipient				Total	
ASIC Code	Description	Australia		Overseas		Total	
		Enterprises	Payments	Enterprises	Payments	Enterprises	Payments
		number	\$'000	number	\$'000	number	\$'000
11-15	MINING (EXCLUDING SERVICES TO MINING)	21	4,491	4	2,687	22	7,178
	Manufacturing -						
21	Food, beverages and tobacco	24	2,184	4	74	27	2,258
23,24	Textiles, clothing and footwear	5	389	3	131	7	520
25	Wood, wood products and furniture	5	334	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	6	149	5	350	9	499
27	Chemical, petroleum and coal products	33	4,180	11	7,174	38	11,353
28	Non-metallic mineral products	9	119	-	-	9	119
29	Basic metal products	n.p.	n.p.	n.p.	n.p.	12	1,543
31	Fabricated metal products	n.p.	n.p.	n.p.	n.p.	11	666
32	Transport equipment	5	134	3	530	n.p.	n.p.
334	Photographic, professional and scientific equipment	4	306	-	-	4	306
335	Appliances and electrical equipment	33	1,705	4	221	35	1,926
336	Industrial machinery and equipment	19	857	3	308	22	1,165
33	Total other machinery and equipment	56	2,868	7	529	61	3,397
34	Miscellaneous manufacturing	n.p.	n.p.	n.p.	n.p.	8	694
C	TOTAL MANUFACTURING	173	12,670	39	9,392	195	22,061
	Other industries -						
F	Wholesale and retail trade	29	12,393	7	900	33	13,293
63	Property and business services	n.p.	n.p.	n.p.	n.p.	38	4,279
8461	Research and scientific institutions	n.p.	n.p.	n.p.	n.p.	10	1,410
(c)	Other n.e.c.	41	7,595	9	20,732	45	28,327
16, D-L	TOTAL OTHER INDUSTRIES	113	23,419	27	23,891	126	47,310
	TOTAL ALL INDUSTRIES	307	40,580	70	35,970	343	76,549
	Private sector contribution to 'Total all industries' -						
	1984-85	272	23,629	65	35,076	307	58,704
	1981-82	245	19,326	38	16,013	266	35,339

(a) Expenditure on R & D which is funded by an enterprise but carried out by others.

(b) Excludes enterprises in ASIC Division 'A'.

(c) ASIC codes 16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 15. EXTRAMURAL R & D EXPENDITURE (a) BY BUSINESS ENTERPRISES (b), AUSTRALIA, 1984-85
 PAYMENTS BY COUNTRY OF RECIPIENT BY RELATIONSHIP OF RECIPIENT TO ENTERPRISE MAKING PAYMENT
 (\$'000)

Country of recipient	Relationship of recipient to enterprise making payment	r 1981-82 (c)			1984-85		
		Industry of enterprise making payment			Industry of enterprise making payment		
		Manufacturing (d)	Mining and other industries (e)	Total all industries	Manufacturing (d)	Mining and other industries (e)	Total all industries
U.K.	Related enterprises	1,744	-	1,744	n.p.	n.p.	n.p.
	Unrelated enterprises	n.p.	n.p.	198	n.p.	n.p.	n.p.
	Total	n.p.	n.p.	1,942	n.p.	n.p.	3,083
U.S.A.	Related enterprises	n.p.	n.p.	4,082	983	n.p.	n.p.
	Unrelated enterprises	n.p.	n.p.	3,851	n.p.	1,589	n.p.
	Total	885	7,048	7,933	n.p.	n.p.	25,076
Other overseas	Related enterprises	n.p.	n.p.	6,172	n.p.	n.p.	6,252
	Unrelated enterprises	206	220	426	n.p.	n.p.	1,559
	Total	n.p.	n.p.	6,598	6,380	1,431	7,811
Total overseas	Related enterprises	5,144	6,853	11,998	n.p.	n.p.	31,917
	Unrelated enterprises	335	4,141	4,476	n.p.	n.p.	4,053
	Total	5,479	10,994	16,473	9,392	26,578	35,970
Australia		10,637	15,642	26,279	12,670	27,910	40,580
TOTAL		16,116	26,636	42,752	22,061	54,488	76,549
Private sector contribution to 'Total all industries' -							
1984-85					21,810	36,894	58,704
1981-82					n.p.	n.p.	35,339

- (a) Expenditure on R & D which is funded by an enterprise but carried out by others.
 (b) Excludes enterprises in ASIC Division 'A'.
 (c) Details for Related and Unrelated Enterprises were incorrectly presented in previous publications. The correct details are shown here.
 (d) ASIC Division C.
 (e) ASIC Divisions B,D-L.

TABLE 16. PAYMENTS AND RECEIPTS FOR TECHNICAL KNOW-HOW BY BUSINESS ENTERPRISES (a), AUSTRALIA
 PAYMENTS AND RECEIPTS BY INDUSTRY OF ENTERPRISE (b)
 (\$m)

Industry of enterprise making payment		Payments for technical know-how			Receipts for technical know-how		
ASIC Code	Description	1978-79	1981-82	1984-85	1978-79	1981-82	1984-85
Manufacturing -							
21	Food, beverages and tobacco	4.0	14.9	16.3	0.4	-	1.1
23,24	Textiles, clothing and footwear	1.2	1.4	8.9	n.p.	-	n.p.
25	Wood, wood products and furniture	)	)	0.1	n.p.	-	n.p.
26	Paper, paper products, printing and publishing	) 1.2	) 2.9))))
27	Chemical, petroleum and coal products	27.4	34.3	37.4	0.1	n.p.	0.2
28	Non-metallic mineral products	4.4	5.6	7.8	3.2	3.6	6.6
29	Basic metal products	4.0	7.6	4.7	0.9	n.p.	n.p.
31	Fabricated metal products	1.4	3.3	2.3	0.6	2.0	6.1
32	Transport equipment	10.1	13.8	17.4	1.3	0.7	1.1
					0.5	2.0	0.9
334	Photographic, professional and scientific equipment	)	)	8.7	)	)	n.p.
335	Appliances and electrical equipment	) 18.6	) 16.9	28.7	) 0.9	) 1.3	n.p.
336	Industrial machinery and equipment	3.3	3.2	3.2	0.2	0.2	1.4
33	Total other machinery and equipment	21.9	20.1	40.6	1.1	1.5	4.8
34	Miscellaneous manufacturing	3.9	3.3	5.2	0.5	0.9	n.p.
C	TOTAL MANUFACTURING	79.5	107.1	144.7	8.8	11.5	23.9
Other industries -							
F	Wholesale and retail trade	)	)	2.2	)	)	n.p.
63	Property and business services	) 29.1	) 28.9	8.4	) 6.6	) 5.9	6.2
8461	Research and scientific institutions	)	)	0.2	)	)	n.p.
(c)	Other n.e.c.	)	)	7.1	)	)	3.8
16, D-L	TOTAL OTHER INDUSTRIES	29.1	28.9	17.9	6.6	5.9	12.3
	TOTAL ALL INDUSTRIES	108.6	136.0	162.6	15.4	17.4	36.2

(a) Excludes enterprises in ASIC Division 'A'.

(b) 1984-85 data are classified by the 1983 edition of ASIC: 1978-79 and 1981-82 data are classified by the 1978 edition of ASIC. If the 1983 version were used to classify 1978-79 and 1981-82 data, only minor differences would occur.

(c) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 17. PAYMENTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
PAYMENTS BY INDUSTRY OF ENTERPRISE

ASIC Code	Industry of enterprise making payment Description	Enterprises number	Total \$'000	Type of technical know-how		Payments within Australia \$'000	Payments made overseas \$'000
				Patent licence fees and royalties \$'000	Other technical know-how \$'000		
	Manufacturing -						
21	Food, beverages and tobacco	22	16,290	n.p.	n.p.	148	16,142
23,24	Textiles, clothing and footwear	11	8,905	n.p.	n.p.	-	8,905
25	Wood, wood products and furniture	6	138	n.p.	n.p.	12	126
26	Paper, paper products, printing and publishing	8	4,093	n.p.	n.p.	42	4,051
27	Chemical, petroleum and coal products	53	37,387	27,900	9,488	997	36,391
28	Non-metallic mineral products	10	7,812	n.p.	n.p.	319	7,493
29	Basic metal products	9	4,665	2,544	2,121	69	4,596
31	Fabricated metal products	17	2,299	1,075	1,224	157	2,142
32	Transport equipment	27	17,355	4,879	12,476	385	16,970
334	Photographic, professional and scientific equipment	9	8,685	8,325	360	137	8,548
335	Appliances and electrical equipment	47	28,651	6,675	21,976	277	28,373
336	Industrial machinery and equipment	33	3,226	1,877	1,349	432	2,794
33	Total other machinery and equipment	89	40,562	16,877	23,685	847	39,716
34	Miscellaneous manufacturing	17	5,212	588	4,625	35	5,177
C	TOTAL MANUFACTURING	269	144,718	69,726	74,992	3,010	141,707
	Other industries -						
F	Wholesale and retail trade	24	2,170	1,947	223	342	1,828
63	Property and business services	38	8,446	5,835	2,611	1,027	7,419
8461	Research and scientific institutions	4	189	94	95	189	-
(b)	Other n.e.c.	20	7,084	2,776	4,308	149	6,935
16, D-L	TOTAL OTHER INDUSTRIES	86	17,889	10,652	7,237	1,707	16,182
	TOTAL ALL INDUSTRIES	355	162,607	80,377	82,229	4,718	157,889
	Private sector contribution to 'Total all industries' -						
	1984-85 (c)	351	160,160	78,127	82,032	4,692	155,468
	1981-82 (c)	280	126,395	69,419	56,976	2,471	123,924

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Codes 11-16,D,G,H,61-62,J,8141-8306,8462-8495,L.

(c) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 18. PAYMENTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
PAYMENTS MADE OVERSEAS BY INDUSTRY OF ENTERPRISE
(\$'000)

ASIC Code	Industry of enterprise making payment Description	Payments made overseas	Relationship of recipient enterprise to paying enterprise		Country of recipient enterprise (b)		
			Related	Unrelated	U.K.	U.S.A.	Other
	Manufacturing -						
21	Food, beverages and tobacco	16,142	n.p.	n.p.	n.p.	5,471	n.p.
23,24	Textiles, clothing and footwear	8,905	n.p.	n.p.	35	n.p.	n.p.
25	Wood, wood products and furniture	126	-	126	16	n.p.	n.p.
26	Paper, paper products, printing and publishing	4,051	n.p.	n.p.	n.p.	3,601	n.p.
27	Chemical, petroleum and coal products	36,391	31,634	4,756	7,999	26,369	2,023
28	Non-metallic mineral products	7,493	n.p.	n.p.	n.p.	n.p.	1,581
29	Basic metal products	4,596	619	3,977	597	1,560	2,439
31	Fabricated metal products	2,142	1,358	784	115	1,465	561
32	Transport equipment	16,970	11,479	5,491	812	3,355	12,803
334	Photographic, professional and scientific equipment	8,548	n.p.	n.p.	n.p.	8,311	n.p.
335	Appliances and electrical equipment	28,373	17,236	11,137	2,225	13,655	12,493
336	Industrial machinery and equipment	2,794	n.p.	n.p.	n.p.	2,101	n.p.
33	Total other machinery and equipment	39,716	26,738	12,977	2,561	24,068	13,087
34	Miscellaneous manufacturing	5,177	4,673	505	2,090	2,740	347
C	TOTAL MANUFACTURING	141,707	104,311	37,397	15,356	82,286	44,066
	Other industries -						
F	Wholesale and retail trade	1,828	1,022	806	129	1,449	250
63	Property and business services	7,419	3,448	3,971	577	5,010	1,831
8461	Research and scientific institutions	-	-	-	-	-	-
(c)	Other n.e.c.	6,935	3,876	3,059	37	6,389	510
16, D-L	TOTAL OTHER INDUSTRIES	16,182	8,345	7,837	743	12,848	2,591
	TOTAL ALL INDUSTRIES	157,889	112,656	45,233	16,098	95,134	46,657
	Private sector contribution to 'Total all industries' -						
	1984-85 (d)	155,468	112,656	42,812	16,067	92,854	46,547
	1981-82 (d)	123,924	93,418	30,506	18,538	65,090	40,297

- (a) Excludes enterprises in ASIC Division 'A'.
 (b) For further information see Table 19.
 (c) ASIC Codes 11-16,D,E,G,H,61-62,J,8141-8306,8462-8495,L.
 (d) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 19. PAYMENTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
PAYMENTS BY COUNTRY OF RECIPIENT (b)
(\$'000)

	Total	Australia	Canada	Federal Republic of Germany	France	Japan	U.K.	U.S.A.	Other
Total all industries	162,607	4,718	950	5,249	5,819	14,097	16,098	95,134	20,542
Private sector contribution to 'Total all industries' -									
1984-85 (c)	160,160	4,692	950	5,139	5,819	14,097	16,067	92,854	20,542
1981-82 (c)	126,395	2,471	367	6,662	1,792	6,698	18,538	65,090	24,777

- (a) Excludes enterprises in ASIC Division 'A'.
 (b) For further information see also Table 18.
 (c) Comparisons between these figures may not be valid. For further information refer to paragraph 4 of the Explanatory Notes.

TABLE 20. RECEIPTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
RECEIPTS BY INDUSTRY OF ENTERPRISE

ASIC Code	Industry of recipient enterprise Description	Enterprises number	Total \$'000	Type of technical know-how		Receipts from within Australia \$'000	Receipts from overseas \$'000
				Patent licence fees and royalties \$'000	Other technical know-how \$'000		
	Manufacturing -						
21	Food, beverages and tobacco	5	1,127	n.p.	n.p.	n.p.	n.p.
23,24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	3	169	n.p.	n.p.	54	115
27	Chemical, petroleum and coal products	11	6,609	n.p.	n.p.	2,650	3,959
28	Non-metallic mineral products	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
29	Basic metal products	5	6,060	n.p.	n.p.	6	6,054
31	Fabricated metal products	10	1,127	n.p.	n.p.	10	1,117
32	Transport equipment	5	891	817	74	58	833
334	Photographic, professional and scientific equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
336	Industrial machinery and equipment	19	1,426	n.p.	n.p.	535	891
33	Total other machinery and equipment	41	4,790	799	3,991	642	4,148
34	Miscellaneous manufacturing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
C	TOTAL MANUFACTURING	91	23,891	13,671	10,220	5,390	18,502
	Other industries -						
F	Wholesale and retail trade	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
63	Property and business services	46	6,151	2,880	3,271	2,355	3,796
8461	Research and scientific institutions	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
(b)	Other n.e.c.	5	3,746	2,688	1,058	140	3,606
16, D-L	TOTAL OTHER INDUSTRIES	62	12,309	5,744	6,565	2,825	9,484
	TOTAL ALL INDUSTRIES	153	36,200	19,415	16,785	8,215	27,985
	Private sector contribution to 'Total all industries' -						
	1984-85	151	36,086	19,301	16,785	8,113	27,973
	1981-82	130	17,346	9,629	7,718	5,150	12,196

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Codes 11-16,D,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 21. RECEIPTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
RECEIPTS FROM OVERSEAS BY INDUSTRY OF ENTERPRISE
(\$'000)

ASIC Code	Industry of recipient enterprise Description	Receipts from overseas	Relationship of paying enterprise to recipient enterprise		Country of paying enterprise (b)		
			Related	Unrelated	U.K.	U.S.A.	Other
C	Manufacturing	18,502	5,793	12,708	3,266	5,803	9,432
B,D-L	Mining and other industries	9,490	4,042	5,442	3,824	3,312	2,347
	TOTAL ALL INDUSTRIES	27,985	9,835	18,150	7,090	9,115	11,780
	Private sector contribution to 'Total all industries' -						
	1984-85	27,973	9,835	18,138	7,090	9,103	11,780
	1981-82	12,196	5,120	7,076	476	2,892	8,828

(a) Excludes enterprises in ASIC Division 'A'.

(b) For further information see also Table 22.

TABLE 22. RECEIPTS BY BUSINESS ENTERPRISES (a) FOR TECHNICAL KNOW-HOW, AUSTRALIA, 1984-85
RECEIPTS BY COUNTRY OF PAYING ENTERPRISE (b)
(\$'000)

	Total	Australia	Canada	Federal Republic of Germany	Japan	New Zealand	U.K.	U.S.A.	Other
Total all industries	36,200	8,215	546	635	899	2,516	7,090	9,115	7,183
Private sector contribution to 'Total all industries' -									
1984-85	36,086	8,113	546	635	899	2,516	7,090	9,103	7,183
1981-82	17,346	5,150	394	303	819	1,687	476	2,892	5,625

(a) Excludes enterprises in ASIC Division 'A'.

(b) For further information see Table 21.

TABLE 23. PATENT ACTIVITY BY BUSINESS ENTERPRISES (a) WITH RESEARCH AND EXPERIMENTAL DEVELOPMENT ACTIVITY IN AUSTRALIA, 1984-85,
PATENT ACTIVITY JULY 1982 - JUNE 1985 BY INDUSTRY OF ENTERPRISE

Industry of enterprise with patent activity		Number of enterprises with patent activity				Patent activity			
		Australia		Overseas		Australia		Overseas	
ASIC Code	Description	Patent applications lodged	Patents granted	Patent applications lodged	Patents granted	Patent applications lodged	Patents granted	Patent applications lodged	Patents granted
Manufacturing -									
21	Food, beverages and tobacco	10	7	8	8	18	10	105	60
23,24	Textiles, clothing and footwear	5	3	3	n.p.	16	8	31	n.p.
25	Wood, wood products and furniture	12	7	7	7	35	22	45	37
26	Paper, paper products, printing and publishing	6	5	6	n.p.	9	8	42	n.p.
27	Chemical, petroleum and coal products	29	16	20	15	132	76	758	334
28	Non-metallic mineral products	12	6	7	6	102	15	86	62
29	Basic metal products	10	7	9	9	49	19	130	91
31	Fabricated metal products	40	28	25	21	161	74	283	210
32	Transport equipment	21	15	9	7	67	39	117	77
334	Photographic, professional and scientific equipment	9	6	9	4	74	66	104	71
335	Appliances and electrical equipment	54	36	32	27	240	90	472	174
336	Industrial machinery and equipment	54	43	34	35	207	95	756	375
33	Total other machinery and equipment	117	85	75	66	521	251	1,332	620
34	Miscellaneous manufacturing	24	15	20	11	58	34	178	66
C	TOTAL MANUFACTURING	286	194	189	156	1,168	556	3,107	1,606
Other industries -									
F	Wholesale and retail trade	38	18	29	18	86	32	133	77
63	Property and business services	78	52	52	42	230	142	698	471
8461	Research and scientific institutions	14	7	13	10	42	16	216	86
(b)	Other n.e.c.	34	16	21	14	74	30	196	104
16, D-L	TOTAL OTHER INDUSTRIES	164	93	115	84	432	220	1,243	738
	TOTAL ALL INDUSTRIES	450	287	304	240	1,600	776	4,350	2,344
	July 1979 - June 1982	319	193	190	137	1,149	560	2,933	1,527

(a) Excludes enterprises in ASIC Division 'A'.

(b) ASIC Codes 11-16,D,E,G,H,61-62,8141-8306,8462-8495,L.

TABLE 24. ENERGY RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA, 1984-85
DETAILS OF RESOURCES DEVOTED TO ENERGY R & D BY INDUSTRY OF ENTERPRISE

Industry of enterprise		Enter- prises (number)	Expenditure (\$'000)				Human resource effort (person years)			
			Total	Type of expenditure			Total	Type of employee		
ASIC Code	Description	Capital expend- iture		Wages and salaries	Other current expend- iture	Resear- chers		Technic- ians	Other support- ing staff	
11-15	MINING (EXCLUDING SERVICES TO MINING)	11	15,647	6,198	2,923	6,526	64	28	24	12
	Manufacturing -									
21	Food, beverages and tobacco	14	1,463	377	715	371	25	16	6	4
23,24	Textiles, clothing and footwear	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
25	Wood, wood products and furniture	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
26	Paper, paper products, printing and publishing	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
27	Chemical, petroleum and coal products	14	1,265	114	804	346	22	14	5	3
28	Non-metallic mineral products	5	330	47	154	129	6	3	3	1
29	Basic metal products	7	6,719	1,237	4,101	1,381	100	51	25	25
31	Fabricated metal products	11	2,040	301	1,177	563	33	12	13	8
32	Transport equipment	5	481	86	308	88	13	10	3	-
334	Photographic, professional and scientific equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
335	Appliances and electrical equipment	32	6,042	691	3,763	1,588	123	43	57	24
336	Industrial machinery and equipment	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.	n.p.
33	Total other machinery and equipment	48	7,499	828	4,502	2,169	149	51	70	27
34	Miscellaneous manufacturing	4	612	189	343	80	12	5	2	6
C	TOTAL MANUFACTURING	112	20,819	3,217	12,457	5,145	366	166	127	73
	Other industries -									
F	Wholesale and retail trade	18	834	93	459	282	18	13	4	1
63	Property and business services	77	15,774	1,713	8,429	5,632	264	70	98	96
8461	Research and scientific institutions	8	8,304	251	4,934	3,118	157	80	34	43
(b)	Other n.e.c.	17	10,681	2,592	5,923	2,167	162	89	48	25
16, D-L	TOTAL OTHER INDUSTRIES	120	35,592	4,648	19,745	11,200	601	253	184	165
	TOTAL ALL INDUSTRIES	243	72,050	14,063	35,125	22,871	1,031	446	335	251
	Private sector contribution to 'Total all industries' -									
	1984-85	231	62,628	12,142	29,617	20,869	884	366	292	226
	1982-83	n.a.	45,805	4,852	28,433	12,519	918	380	290	248

(a) Excludes enterprises in ASIC Division 'A'.
(b) ASIC Codes 16,D,G,H,61-62,J,8141-8306,8462-8495,L.

TABLE 25. ENERGY RESEARCH AND EXPERIMENTAL DEVELOPMENT CARRIED OUT BY BUSINESS ENTERPRISES (a), AUSTRALIA
R & D EXPENDITURE BY ENERGY OBJECTIVE CODE BY SOURCE OF FUNDS
(\$'000)

Energy objective code		1982-83			1984-85		
		Total	Source of funds		Total	Source of funds	
Code	Description		Industry (b)	Government (c)		Industry (b)	Government (c)
Production and utilisation of energy							
Oil and gas							
06003	Mining extraction techniques	n.p.	n.a.	n.a.	5,273	n.p.	n.p.
10001	Refining, transport and storage	2,620	n.a.	n.a.	1,418	n.p.	n.p.
(d)	Other	2,230	n.a.	n.a.	734	n.p.	n.p.
(e)	Oil shale and tar sands	n.p.	n.a.	n.a.	690	584	106
	Total oil	4,899	4,871	28	8,115	7,817	298
Coal							
06002	Mining extraction techniques	n.p.	n.a.	n.a.	8,777	5,820	2,957
10010	Preparation and transport	5,136	n.a.	n.a.	8,725	7,866	860
10011	Combustion	2,808	n.a.	n.a.	3,159	2,472	687
10050	Conversion	2,503	n.a.	n.a.	1,384	139	1,245
(f)	Other	3,449	n.a.	n.a.	8,541	8,023	519
	Total coal	19,985	14,252	5,733	30,586	24,319	6,267
Solar							
10015	Heating and cooling	2,778	n.a.	n.a.	2,126	1,821	305
10016	Photo-electric	682	n.a.	n.a.	1,571	1,044	527
10017	Thermal-electric	431	n.a.	n.a.	187	187	-
	Total solar	3,891	3,148	743	3,884	3,052	832
Nuclear							
Non-breeder							
10020	Light water reactor	-	n.a.	n.a.	-	-	-
10024	Other converter reactor	-	n.a.	n.a.	-	-	-
(g)	Fuel cycle	n.p.	n.a.	n.a.	6,174	n.p.	n.p.
10026	Supporting technologies	n.p.	n.a.	n.a.	-	-	-
10030	Breeder	-	n.a.	n.a.	-	-	-
10035	Fusion	n.p.	n.a.	n.a.	-	-	-
	Total nuclear	2,642	2,413	229	6,174	n.p.	n.p.
Other primary sources							
10040	Wind	283	n.a.	n.a.	360	286	73
10041	Ocean	-	n.a.	n.a.	n.p.	n.p.	n.p.
10042	Geothermal	-	n.a.	n.a.	n.p.	n.p.	n.p.
10052	Biomass	2,644	n.a.	n.a.	1,047	830	218
10049	Other sources and new vectors	2,100	n.a.	n.a.	n.p.	n.p.	190
	Total other primary sources	5,027	4,642	385	2,600	n.p.	n.p.
	TOTAL PRODUCTION AND UTILISATION OF ENERGY	36,444	29,326	7,118	51,358	41,796	9,562
Conservation of energy							
10060	Industry	5,605	n.a.	n.a.	4,213	3,388	825
10062	Residential and commercial	3,349	n.a.	n.a.	2,602	2,311	291
10064	Transportation	8,356	n.a.	n.a.	n.p.	4,836	n.p.
10069	Other	1,298	n.a.	n.a.	n.p.	652	n.p.
	TOTAL CONSERVATION OF ENERGY	18,608	16,145	2,463	13,781	11,187	2,595
Other energy R & D							
10070	Electric power conversion	2,533	n.a.	n.a.	789	722	67
10072	Electricity transmission and distribution	497	n.a.	n.a.	4,200	3,672	529
10074	Energy storage n.e.c.	640	n.a.	n.a.	753	n.p.	n.p.
10076	Energy systems analysis	78	n.a.	n.a.	295	n.p.	n.p.
10079	Other	245	n.a.	n.a.	881	881	-
	TOTAL OTHER ENERGY R & D	3,994	3,511	483	6,919	6,201	718
	TOTAL	59,047	48,982	10,064	72,058	59,184	12,875
Private sector contribution to 'Total all industries' -							
1984-85					62,628	50,806	11,823
1982-83					45,805	36,888	8,917

- (a) Excludes enterprises in ASIC Division 'A'
- (b) Includes private and public business enterprises and private non-profit organisations.
- (c) Includes Commonwealth and State government organisations, universities and colleges of advanced education.
- (d) Energy objective codes 04003,10004,10082.
- (e) Energy objective codes 04004,06004,10005,10009,10083.
- (f) Energy objective codes 04002,10014,10081.
- (g) Energy objective codes 04001,06001,10025,10080.