

70 Scientific and industrial instruments and systems

This Report on the Scientific and Industrial Instruments and Systems Industry relates to establishments engaged wholly or mainly in manufacturing lenses, prisms and other optically worked elements, telescopes, binoculars, monoculars, microscopes, optical surveying instruments, optical metrological instruments, optical density measuring equipment, optical nautical and aeronautical and gunnery control instruments, ophthalmic instruments, photocells and other optical instruments and apparatus; scientific instruments, equipment and systems for sensing, measuring, indicating, recording and/or control of mechanical, electrical (including electronic), and magnetic magnitudes, including simple measuring devices such as pressure gauges and meters, ultrasonic instruments and equipment, mechanical and electrical medical measuring instruments but excluding other electro-medical equipment. Photographic and cinematograph apparatus, engineers' gauges (other than optical), and the grinding of spectacle lenses are also excluded.

This industry corresponds to minimum list heading 354 in the Standard Industrial Classification (Revised 1968) which has been used for the first time as a basis of classification in the 1968 Census.

The industry formed part of the Scientific, Surgical and Photographic Instruments, etc Industry (Part 53) in the last detailed Census of Production for 1963, corresponding to the sub-divisions 'Optical instruments' and 'Other scientific instruments and appliances' except that oxygen breathing apparatus is now included in the Report on the Surgical Instruments and Appliances Industry (Part 69). Gas meters, parking meters and taximeters included in the Report on Miscellaneous (Non-electrical) Machinery Industry (Part 49) for 1963 are now included in this industry as are also pressure and vacuum measuring instruments formerly in General Mechanical Engineering Industry (Part 52); electricity supply meters formerly in Electrical Machinery Industry (Part 55); instruments for measuring and testing electric magnitudes, instruments for physical and chemical analysis, and nucleonic instruments formerly in Radio and Other Electronic Apparatus Industry (Part 58); and ophthalmic instruments and appliances and parts thereof previously included in the 'Spectacles etc' sub-division of the Report on Scientific, Surgical and Photographic Instruments, etc Industry.

Throughout this Report, the figures given for 1963 have been reclassified, as far as possible, according to the Standard Industrial Classification (Revised 1968) so that data for 1963 and 1968 are on the same industrial basis. However the reclassification of small firms, which provided limited information only, has been arbitrary.

In interpreting the data in the tables it is essential to bear in mind the notes and definitions which appear on pages (i) to (iv).

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(c) Including services rendered to other organisations (amounts charged for hiring out plant, machinery or other goods, for providing transport, or for technical or other services rendered).

(d) Administrative, technical and clerical employees.

(e) Excluding expenditure for establishments not yet in production.

(f) Acquisitions less disposals.

TABLE 1 Industry summary, 1963 and 1968
United Kingdom (a) (b)

	Unit	All establishments		
		1963	1968	
Number of enterprises	No.	750	945	
Number of establishments	"	930	1,160	
Gross output	£'000	215,226	360,789	
Net output	"	133,301	220,982	
Net output per head	£	1,260	1,819	
Sales and work done	{ goods produced and work done (c)	£'000	192,011	328,909
	{ merchanted goods and canteen takings	"	18,366	22,202
Purchases	{ materials for use in production and packaging and fuel	"	63,300	115,387
	{ goods for merchenting and canteen purchases	"	13,822	18,658
Payments to other organisations	{ for work done on materials given out for transport	"	5,277	7,637
	{ by road	"	806	886
	{ by rail and other means excluding postal services	"		785
Stocks and work in progress				
Total stocks and work in progress	{ change during year	"	+ 6,129	+ 13,224
	{ at end of year	"	76,670	147,126
Goods on hand for sale	{ change during year	"	+ 1,577	+ 2,973
	{ at end of year	"	12,352	20,587
Work in progress	{ change during year	"	+ 3,271	+ 6,706
	{ at end of year	"	40,151	75,466
Materials, stores and fuel	{ change during year	"	+ 1,281	+ 3,545
	{ at end of year	"	24,167	51,073
Number employed on average during the year	{ total, including working proprietors	Th.	105.8	121.5
	{ operatives	"	69.0	72.2
	{ other employees (d)	"	36.1	48.5
Wages and salaries	{ of operatives	£'000	44,206	60,664
	{ of other employees (d)	"	33,712	61,855
Capital expenditure (e)				
Total	"	8,386	11,594	
New building work	"	2,783	1,831	
Land and existing buildings (f)	"	97	10	
Plant and machinery (f)	"	5,057	8,758	
Vehicles (f)	"	449	995	

(a) For 1968, estimates for establishments not making satisfactory returns and for small establishments from which only employment data were collected, accounted for 5 per cent of the total figures in which they were incorporated: of this, unsatisfactory returns were negligible. For 1963 the comparable figures were 5 per cent. and 1 per cent. respectively.

(b) The following information relates to small establishments (employing fewer than 25 persons) in this industry. It includes an estimate for small establishments not making satisfactory returns.

	1963	1968
Number of establishments	527	718
Average number employed		
Working proprietors	613	669
Other persons employed	3,725	5,647

Footnotes continued on page 70/2.

TABLE 2 Analysis by size of establishment within the industry, 1968

(i) Output and employment

All establishments: United Kingdom

Number employed on average during the year by the establishment (a)	Estab-lish-ments	Enter-prises (b)	Total number employed on average during the year (a)	Gross output	Net output	Net output per head
	Number	Number	Number	£'000	£'000	£
1-5	244	242	762	..	..	..
6-10	181	176	1,422	..	..	..
11-24	230	220	3,930	..	..	..
25-49	92	87	3,424	10,921	5,977	1,746
50-99	116	107	8,321	25,626	15,564	1,870
100-199	94	73	13,319	42,129	23,704	1,780
200-399	68	39	19,240	55,477	34,023	1,768
400-499	13	12	5,604	18,523	11,049	1,972
500-749	20	14	12,540	44,157	25,322	2,019
750-999	14	13	12,398	36,948	23,802	1,920
1,000-1,999	20	16	29,390	81,700	51,972	1,768
2,000 and over	4	4	10,875	26,475	18,033	1,658
Unsatisfactory returns	64	64	273	..	..	..
Total	1,160	945	121,498	360,789(c)	220,982(c)	1,819(c)

(ii) Employees, wages and salaries

All establishments: United Kingdom

Number employed on average during the year by the establishment (a)	Employees		Wages and salaries		Wages and salaries per head	
	Oper-atives	Others (d)	Oper-atives	Others (d)	Oper-atives	Others (d)
	Number	Number	£'000	£'000	£	£
1-5	..	..	..	..	..	..
6-10	..	..	..	..	..	..
11-24	..	..	..	..	..	..
25-49	2,505	867	2,014	1,170	804	1,349
50-99	5,472	2,796	4,854	3,569	887	1,277
100-199	8,460	4,837	7,111	6,357	841	1,314
200-399	12,151	7,081	10,752	8,675	885	1,225
400-499	3,369	2,229	2,503	2,745	743	1,232
500-749	7,009	5,531	6,220	6,740	887	1,218
750-999	7,283	5,112	5,930	6,709	814	1,312
1,000-1,999	16,244	13,146	13,393	17,118	824	1,302
2,000 and over	6,268	4,607	4,980	5,876	794	1,276
Unsatisfactory returns	..	..	..	..	..	..
Total	72,205(c)	48,475(c)	60,664(c)	61,855(c)	840(c)	1,276(c)

(a) Including working proprietors.

(b) The sum of the figures for the size groups exceeds the total for the industry to the extent that enterprises made returns for establishments in more than one size group.

(c) Including estimates for establishments employing fewer than 25 persons and for establishments not making satisfactory returns.

(d) Administrative, technical and clerical employees.

TABLE 3 Percentage analysis of employees, by age and sex, 1969 (a)

All establishments: United Kingdom

Ages	Males	Females	All employees
	Per cent.	Per cent.	Per cent.
Under 18	2	2	4
18 and over	66	30	96
All ages	68	32	100

Source: Department of Employment

(a) The percentages relate to the numbers employed (excluding working proprietors) at June 1969, the earliest date for which the information is available on the basis of the Standard Industrial Classification, (Revised 1968).

Footnotes to Table 4

- (a) Some establishments employing fewer than 25 persons were included in returns for larger establishments. These amounted to 23 establishments in 1968 and 31 in 1963.
- (b) The method of classifying returns to sub-divisions of the industry is explained in the notes; the characteristic products of each sub-division are identified in Table 5.
- (c) The sum of the figures for the sub-divisions exceeds the total for the industry to the extent that enterprises made returns for more than one sub-division.
- (d) Including services rendered to other organisations (amounts charged for hiring out plant, machinery or other goods, for providing transport, or for technical or other services rendered).
- (e) Direct sales of goods (excluding canteen takings) made to, and work done for, the general public by larger establishments are included. These amounted to £108,000 in 1968. Similar information is not available for 1963.
- (f) Characteristic products relate only to specific sub-divisions of the industry.
- (g) For sub-divisions of the industry, this is the ratio of sales of characteristic products to total sales of goods produced and work done. For the industry as a whole, this is the ratio of total sales of principal products by the industry to total sales of goods produced and work done.
- (h) Progress payments received for work in progress in 1968 from United Kingdom customers were recorded as £14,318,000 at the beginning of year and £16,634,000 at the end of year, and from overseas customers £1,185,000 at the beginning of year and £1,484,000 at end of year. Similar information is not available for 1963.
- (i) Administrative, technical and clerical employees.
- (j) Excluding expenditure for establishments not yet in production.
- (k) Acquisitions less disposals.

TABLE 4 Analysis of larger establishments, 1963 and 1968

Establishments employing 25 or more persons: Analysis of returns received, United Kingdom (a)

	Unit	Sub-divisions of the industry (b)		
		Optical instruments	Industrial control systems and equipment	
		10	21	
		1968	1968	
Number of enterprises (c)	No.	28	67	
Number of establishments	"	34	91	
Gross output	£'000	17,405	90,318	
Net output	"	12,503	53,476	
Net output per head	£	1,695	1,820	
Sales and work done	{ goods produced and work done (d) (e)	£'000	15,588	84,276
	{ merchanted goods and canteen takings	"	584	4,029
Sales of characteristic products	"	10,052	46,815	
Index of specialisation (g)	Per cent.	64	56	
Purchases	{ materials for use in production and packaging, and fuel	£'000	4,393	31,392
	{ goods for merchenting and canteen purchases	"	445	3,517
	{ for work done on materials given out for transport	"	203	1,733
Payments to other organisations	{ by road	"	32	280
	{ by rail and other means excluding postal services	"	50	130
Stocks and work in progress				
Goods on hand for sale	{ change during year	"	+ 94	- 94
	{ at end of year	"	1,638	2,517
Work in progress (h)	{ change during year	"	+ 1,138	+ 2,107
	{ at end of year	"	5,822	19,576
Materials, stores and fuel	{ change during year	"	+ 221	+ 209
	{ at end of year	"	2,239	12,237
Number employed on average during the year	{ total including working proprietors	No.	7,377	29,377
	{ operatives	"	4,653	16,437
	{ other employees (i)	"	2,710	12,904
Wages and salaries	{ of operatives	£'000	3,558	14,270
	{ of other employees (i)	"	3,727	17,435
Wages and salaries per head	{ operatives	£	765	868
	{ other employees (i)	"	1,375	1,351
Capital expenditure (j)				
New building work	£'000	141	341	
Land and existing buildings	{ acquisitions	"		108
	{ disposals	"	255 (k)	665
Plant and machinery	{ acquisitions	"	639	2,229
	{ disposals	"	59	132
Vehicles	{ acquisitions	"	87	402
	{ disposals	"	14	159

For notes to this table - see page 70/5.

	Sub-divisions of the industry (b)			Total	
	Instruments for measuring and testing non-electrical and electrical magnitudes	Instruments for physical and chemical analysis	Other scientific industrial, etc instruments and apparatus	1963	1968
	22	25	23, 24 & 26	1963	1968
	1968	1968	1968	1963	1968
	92	26	102	247	280
	140	39	160	417	464
	77,427	27,962	129,720	204,630	342,833
	48,175	16,923	78,906	126,738	209,983
	1,791	1,907	1,839	1,260	1,819
	68,833	25,484	118,358	182,559	312,539
	4,818	1,482	10,183	17,462	21,097
	48,070	19,293	(f)	(f)	(f)
	70	76	..	78	79
	23,758	8,829	41,273	60,184	109,644
	4,009	1,169	8,589	13,142	17,729
	1,670	899	2,752	5,018	7,257
	129	47	355	767	841
	226	46	293		746
	+ 782	+ 458	+ 1,585	+ 1,499	+ 2,825
	4,683	3,387	7,337	11,744	19,562
	+ 2,995	+ 538	- 406	+ 3,110	+ 6,372
	19,716	6,762	19,833	38,174	71,710
	+ 540	- 48	+ 2,447	+ 1,218	+ 3,369
	10,303	4,199	19,552	22,977	48,532
	26,904	8,876	42,917	100,619	115,451
	16,229	4,920	26,749	65,948	68,988
	10,622	3,941	16,138	34,479	46,315
	13,243	4,515	22,375	42,240	57,961
	13,191	4,905	19,841	32,242	59,099
	816	918	836	641	840
	1,242	1,245	1,229	935	1,276
	517	99	642	2,646	1,740
	690		75	784	1,177
	35	- 160 (k)	260	692	1,167
	2,063	581	3,334	5,104	8,845
	181	54	97	296	523
	329	109	475	701	1,401
	118	33	132	274	456

TABLE 5 Sales of principal products of the industry by larger establishments, including sales by establishments classified to other industries, 1963 and 1968

Establishments employing 25 or more persons: Analysis of returns received, United Kingdom

Industry sub-division (a)	1963		1968			
	Quantity	Value	Quantity	Value	Enterprises	Entries
10		£'000		£'000	Number	Number
Optical instruments and appliances and parts thereof						
Ophthalmic instruments and appliances and parts thereof (b)	..	592	..	533	16	19
Finished lenses and other optical elements, optically worked, mounted or unmounted, sold separately						
Photographic and cinematographic	..	1,006	..	2,448	10	12
Other (excluding ophthalmic)	..	907	..	1,805	18	20
Microscopes (including parts, but excluding lenses and other optical elements)	..	1,961	..	2,952	12	12
Telescopes, binoculars and monoculars (including parts, but excluding lenses and other optical elements)	..	450	..	200	7	7
Optical surveying instruments and equipment	..	1,116	..	1,418	5	5
Optical nautical, aeronautical and gunnery control instruments	..	1,082	..	1,286	13	13
Other optical instruments and appliances (including industrial instruments but excluding instruments for engineering metrology and for physical and chemical analysis) and parts thereof (c)	..	972(d)	..	3,501	43	50
Total optical instruments and appliances and parts thereof		8,086		14,143	..	..
21						
Industrial control systems and equipment						
Complete systems for monitoring and control						
Data logging, monitoring, displaying, recording and control processes which are essentially continuous (including telemetry, which is part of the system, but excluding computers of peripheral equipment where separable)	26,538	44	55
Monitoring and control systems of batch and other manufacturing processes (excluding computers or peripheral equipment where separable), sequential control of machines, static switching, proportioning, blending, etc	..	45,050(e)	..	14,879	47	53
Control systems for handling and storage	1,439	12	12
Other systems not described separately above	4,088	31	34
Power electronics equipment	3,898	26	29
Machine tool numerical control and indication equipment (excluding computers or peripheral equipment where separable)	3,949	14	15
Controls for mechanical handling equipment other than complete systems	1,461	20	20
Other industrial control equipment (excluding computers or peripheral equipment where separable)	16,254	67	73
Total industrial control systems and equipment		45,050(e)		72,503	..	..

TABLE 5 (continued)

Industry sub-division (a)	1963		1968			
	Quantity	Value	Quantity	Value	Enterprises	Entries
	Thousands	£'000	Thousands	£'000	Number	Number
22						
Scientific, industrial, etc instruments and apparatus						
Instruments for measuring and testing non-electric magnitudes						
Instruments for engineering metrology (eg for measuring length, roundness, thickness, angular displacement, inclination, alignment and attitude and level/horizontal) (f)	17.0	1,911	30	4,649	21	25
	..	1,978	..	754		
Weighing equipment, force and work measuring instruments, and density measuring instruments (g)	..	975(d)	..	2,446	28	29
Pressure and vacuum measuring instruments	..	3,705	2,526	6,523	52	60
			..	761		
Instruments for measuring thermal magnitudes (excluding potentiometric recorders and chart recorders used for temperature measurement) (h)						
Thermometers, liquid in glass	5,217	1,141	2,881	1,064	12	13
			..	324		
Other (including pyrometers)	..	3,711	..	4,880	29	38
Accelerometers, shock and vibration meters			1.6	111	6	6
Counting and velocity measuring instruments (including tachometers and speedometers other than for motor vehicles)			3,711	1,789	20	21
			..	1,352		
Tachometers for motor vehicles			..	165	*	*
Speedometers for motor vehicles			2,116	4,416	*	*
Flow measuring instruments						
Liquid			102	3,788	20	24
			..	3,376		
Other, including gaseous			4.4	431	21	23
			..	551		
Level/depth measuring instruments			10.1	948	18	19
			..	981		
Humidity and moisture measuring instruments			5.1	170	11	12
			..	228		
Other instruments for measuring and testing non-electric magnitudes			..	2,061	26	29
Total instruments for measuring and testing non-electric magnitudes				41,767	..	..
22						
Instruments for measuring and testing electric magnitudes (excluding domestic supply meters and nucleonic and ultrasonic instruments)						
Ammeters, voltmeters, wattmeters and the like			311	3,920	23	29
			..	742		
Resistance, reactance, inductance, capacitance measuring instruments			52.0	3,089	14	18
			..	898		
Frequency meters, electronic counters and timers, frequency converters and accessories for use with counters			..	4,875	18	20
Signal generators and waveform generators			8.9	2,532	10	11
			..	499		

Continued on next page.

TABLE 5 (continued)

Industry sub-division (a)	1963		1968			
	Quantity	Value £'000	Quantity	Value £'000	Enterprises Number	Entries Number
22	Scientific, industrial, etc instruments and apparatus (continued)					
		£'000		£'000		
	Instruments for measuring and testing electric magnitudes (excluding domestic supply meter and nucleonic and ultrasonic instruments) (continued)					
	Oscilloscopes and accessories		..	3,350	11	13
	Other and unclassified instruments for measuring and testing electric magnitudes		..	6,208	34	44
	Total instruments for measuring and testing electric magnitudes			26,112	..	..
24	Ultrasonic instruments					
	Low power density liquid systems primarily for cleaning		..	330	*	*
	Other ultrasonic equipment (including sensors, detectors but excluding medical instruments)		..	1,279	13	13
25	Instruments for physical and chemical analysis					
	Spectrographs, spectrometers (other than mass spectrometers), Fluorimeters, spectrofluorimeters	..	43,074 (i)	..	2,999	10
	X-ray diffraction apparatus, X-ray fluorescent apparatus			..	1,154	7
	Spectrophotometers and absorptiometers			..	4,734	5
	Gas chromatographs		Thousands	2.4	2,081	9
	Gas analysers		{	3.8	1,198	13
			..	396	396	15
	Mass spectrometers		..	2,864	*	*
	PH meters and electrochemical apparatus (including polarographs)		..	809	5	5
	Other physical and chemical analytic equipment not elsewhere specified		..	5,114	33	40
	Total instruments for physical and chemical analysis			21,350	..	..
26	Recorders and controllers					
	Galvanometric and similar pen recorders and controllers		{	17.9	1,870	20
			..	832	832	23
	UV recorders		..	543	*	*
	XY plotters		0.8	384	*	*
	Pressure switches and thermostats		..	13,524	39	45
	Timers and programme controllers (excluding time switches and process timers)		{	117	1,715	15
			..	237	237	15
	Electromechanical, electric and electronic recorders and controllers					
	Potentiometric recorders and controllers		{	6.2	1,689	15
			..	2,112	2,112	16

TABLE 5 (continued)

Industry sub-division (a)	1963		1968			
	Quantity	Value £'000	Quantity Thousands	Value £'000	Enterprises Number	Entries Number
	Scientific, industrial, etc instruments and apparatus (continued)					
	Recorders and controllers (continued)					
	Electromechanical, electric and electronic recorders and controllers (continued)					
	Components of integrated control systems eg force balance indicators and controllers, three term controllers, transducer transmitters, etc					
			..	4,754	19	23
	Mechanical (eg pneumatic and hydraulic) recorders and controllers					
	Components of integrated control systems eg force balance indicators and controllers, transducer transmitters, etc					
			0.8	3,533	9	10
	Other					
			..	1,042	15	16
	Total recorders and controllers					
		..		32,236	..	..
26	Other measuring instruments and devices					
	Meteorological instruments (j)	..	856	{	53.3	364
				..	531	531
					10	12
	Mathematical and precision drawing instruments and machines (excluding document copying equipment) (k)	..	2,035	{	376	849
				..	2,592	2,592
					16	16
	Water supply meters	Thousands	279	2,153(1)	396	3,140
	Gas meters				7	8
	Domestic					
	Complete	..	4,311	{	842	6,521
	Parts			..	1,825	12
	Other					
	Complete	..	1,148	{	15.3	1,296
	Parts			..	726	12
	Parking meters	..	169	..	394	*
	Electricity meters					
	Complete					
	Pre-payment type AC and DC	204	1,911	216	2,059	*
	Singlephase credit type AC	{	1,159	3,253	1,106	3,604
		..	850	850	850	5
	Polyphase credit type AC	71.8	1,320	65.0	1,204	5
	Other integrating meters AC and DC	14.3	580	..	1,338	5
	Parts	..	521	..	660	8
	Surveying instruments and apparatus (other than optical) (m)	..	486	..	426	6
	Other measuring instruments and devices	..	(n)	..	11,493	55
	Total other measuring instruments and devices		19,593		39,022	..

Continued on next page.

TABLE 5 (continued)

Industry sub-division (a)	1963		1968			
	Quantity	Value	Quantity	Value	Enter-prises	Entries
	Thousands	£'000		£'000	Number	Number
Scientific, industrial, etc instruments and apparatus (continued)						
26 Gunnery control apparatus (other than optical)	..	2,018	..	2,419	9	10
26 Nautical instruments, not specified above (other than optical instruments)						
Echo sounders	1.5	1,401	}	..	..	..
Other	..	1,766				
26 Aeronautical instruments, not specified above (other than optical instruments)	..	3,879	..	7,018	22	24
26 Aeronautical instruments, not specified above (other than optical instruments)	..	16,958	..	21,945	30	33
23 Nucleonic instruments and controls (o)						
Radiation measuring and detecting instruments (including health physics instruments)	..	6,465(d)	..	1,947	10	10
Other nucleonic instruments	..		..	2,076	12	15
Scientific, industrial, etc instruments and apparatus not elsewhere specified	..	3,220(d)	..	3,123	33	34
Other products	..	2,026	..	509	15	18
Waste products	..	405	..	811	90	116
Work done		4,751		3,278	63	68
Total		172,113		294,643	..	..
Sales in other industries (see Table 6)		29,857		47,754	..	..
Principal products of this industry sold by establishments in the industry		142,256		246,889	280	373(p)

Footnotes to Table 5

- (a) The number given is that of the sub-division of which the item is a characteristic product. The sales shown are total sales by larger establishments, not merely sales by establishments classified to the sub-division.
- (b) For 1963 described as 'Excluding surgical instruments'.
- (c) For 1963 described as 'Other optical instruments and appliances including industrial and surgical instruments (but excluding photographic and cinematographic instruments) and parts thereof'.
- (d) Revised figures.
- (e) For 1963 includes £13,073,000 (Revised) described as 'Other electronic industrial process control equipment' in the Radio and Other Electronic Apparatus Industry report (Part 58) and £31,977,000 described as 'Other process measuring and control instruments; indicating, regulating, recording and controlling' in the Scientific, Surgical and Photographic Instruments, etc Industry report (Part 53).
- (f) For 1963 described as 'Engineers' measuring instruments and machines (other than electrical measuring instruments, optical instruments and engineers' gauges)'.
- (g) For 1963 described as 'Precision balances for use in assay, laboratory and similar work'.
- (h) For 1963 described as follows
- | | |
|---|-------|
| Thermometers | £'000 |
| Clinical | 308 |
| Other liquid in glass | 833 |
| Other kinds including vapour pressure and mercury in steel | 1,531 |
| Pyrometers and temperature gauges, recorders and controls, other than thermostats | 2,180 |
- (i) Owing to the differences in the detail collected for 1963 it is not possible to obtain a great degree of comparability at commodity level. The information for 1963 is made up as follows:-
- | | |
|--|---------------|
| | Value |
| | £'000 |
| Scientific, industrial, etc instruments and apparatus, not elsewhere specified (Part 53) | |
| Electrical measuring instruments (excluding supply meters and instruments for motor vehicles and aircraft) | 9,920 |
| Thermostats (including automatic control apparatus for refrigerating and heating) | 8,815 |
| Laboratory instruments and apparatus (excluding precision balances) | 8,854 |
| | (Revised) |
| Electronic measuring and testing instruments: (Part 58) | |
| Mainly used in the testing of radio, radar and television equipment | 8,311 |
| Other, not elsewhere specified, including medical, surgical and surveying instruments but excluding industrial process control equipment | 7,174 |
| | <u>43,074</u> |
- (j) For 1963 described as 'Barometers, hygrometers and similar instruments (excluding thermometers) and barographs, hygrographs, thermographs, sunshine recorders, rain gauges, anemometers, etc'.
- (k) For 1963 described as 'Mathematical and precision drawing instruments and machines and parts thereof'.
- (l) For 1963 includes some parts.
- (m) Electronic instruments were specifically excluded for 1963.
- (n) Not recorded separately for 1963.
- (o) For 1963 described as 'Nucleonic Instruments in the report on the Radio and Other Electronic Apparatus Industry (Part 58)'.
- (p) This figure represents the total number of returns made for larger establishments in this industry which is less than the total number of establishments shown in Table 4 on account of combined returns covering more than one establishment.

TABLE 6 Sales of principal products of the industry by larger establishments classified to other industries, 1963 and 1968

Establishments employing 25 or more persons:
Analysis of returns received, United Kingdom

	1963		1968	
	Value	Value	Entries	Principal industries in which produced (a)
	£'000	£'000	Number	
Optical instruments and appliances and parts thereof				
Ophthalmic instruments and appliances, complete and parts	168	319	*	51,69,77
Finished lenses and other optical elements, optically worked, mounted or unmounted, sold separately	185	208	8	67,69
Other optical instruments and appliances (including industrial instruments, but excluding instruments for engineering metrology, instruments for physical and chemical analysis) and parts thereof	246	831	15	51,69,77,87
Total optical instruments and appliances and parts thereof	599	1,359	..	
Industrial control systems and equipment				
Complete systems for monitoring and control				
Data logging, monitoring, displaying, recording and control processes (including telemetry which is part of the system, but excluding computers or peripheral equipment where separable) which are essentially continuous processes		7,990	16	71,76,77,79
Monitoring and control systems of batch and other manufacturing processes (excluding computers or peripheral equipment where separable), sequential control of machines, static switching, proportioning, blending, etc	5,376	2,208	15	71,77,79,84
Other systems not described separately above		1,901	23	71,74,75,76
Power electronics equipment		212	8	73,77,78,84
Other industrial control equipment (excluding computers or peripheral equipment where separable)		5,659	38	71,74,77,78
Total industrial control systems and equipment	5,376	17,970	..	
Scientific, industrial, etc instruments and apparatus				
Instruments for measuring and testing non-electric magnitudes				
Pressure and vacuum measuring instruments	1,760	1,446	18	52,64,79,87
Instruments for measuring thermal magnitudes (excluding potentiometric recorders and chart recorders used for temperature measurement)	76	412	5	61,71,78,79

TABLE 6 (continued)

	1963	1968		
	Value	Value	Entries	Principal industries in which produced (a)
	£'000	£'000	Number	
Scientific, industrial, etc instruments and apparatus (continued)				
Instruments for measuring and testing non-electric magnitudes (continued)				
Counting and velocity measuring instruments (including tachometers and speedometers but excluding speedometers for motor vehicles)		1,343	13	66,79,81,82
Speedometers for motor vehicles		4,416	*	66,79,82
Flow measuring instruments		300	7	52,71,80,84
Other instruments for measuring and testing non-electric magnitudes		403	21	(b)
Total instruments for measuring and testing non-electric magnitudes		8,320	..	
Instruments for measuring and testing electric magnitudes (excluding domestic supply meters and nucleonic and ultrasonic instruments)				
Signal generators and waveform generators		347	*	74,77
Oscilloscopes and accessories	13,991	417	5	75,77
Other and unclassified instruments for measuring and testing electric magnitudes		1,821	21	71,74,75,77
Total instruments for measuring and testing electric magnitudes		2,585	..	
Ultrasonic instruments		244	7	61,71,77,82
Instruments for physical and chemical analysis		451	8	74,77
Recorders and controllers				
Pressure switches and thermostats		1,945	19	52,72,78,79
Other recorders and controllers		934	12	52,73,74,97
Other measuring instruments and devices				
Parking meters, water supply, gas and electricity meters, complete and parts		1,648	29	(b)
Other measuring instruments and devices		3,531	30	71,74,77,79
Total other measuring instruments and devices		5,179	..	
Gunnery control apparatus (other than optical), nautical and aeronautical instruments (other than optical instruments)	3,398	5,651	10	57,71,73,77
Nucleonic instruments and controls	3,636	1,381	8	75,76,77,84
Scientific, industrial, etc, instruments and apparatus not elsewhere specified	1,021	1,735	23	52,77,84,127
Total	29,857	47,754	..	

(a) The references given are to the list at the front of this report.

(b) Production is widely distributed.

TABLE 7 Sales of other than principal products by larger establishments in the industry, 1963 and 1968

Establishments employing 25 or more persons:
Analysis of returns received, United Kingdom

	1963	1968
	Value	Value
	£'000	£'000
Mechanical engineering		
Pumps, valves and compressors, complete	642	1,939
Office machinery, complete and parts	179	449
Space heating, ventilating and air-conditioning equipment, complete and parts	564	189
Miscellaneous (non-electric) machinery, complete and parts	344	1,860
Other and unclassified engineering products	710	4,307
Photographic and cinematographic apparatus and appliances and document copying equipment, complete, parts and accessories	844	1,250
Surgical instruments and appliances	362	864
Electrical engineering		
Electrical machinery, complete and parts	1,846	10,006
Insulated wires and cables	198	186
Telegraph and telephone apparatus and equipment, complete and parts	3,059	2,796
Radio and electronic components	1,107	5,895
Broadcast receiving and sound reproducing equipment, complete	241	589
Electronic computer systems, complete	1,732	3,697
Radio, radar and electronic capital goods		
Radar and electronic navigation aid equipment, complete	1,978	4,610
Other	4,223	2,241
Other electrical goods	6,379	4,269
Engineers' small tools and gauges	348	282
Glass manufactures, other than containers	228	234
Plastics products	120	322
Other products	3,214	4,317
Repair and jobbing work	4,050	5,709
Research and development work	7,269	7,996
Services rendered to other organisations (a)	667	1,643
Total value of goods sold without having been subjected to any manufacturing process (merchanted or factored)	16,604	19,958
Canteen takings	858	1,139
Total	57,767	86,746

(a) Amounts charged for hiring out plant, machinery or other goods, for providing transport, or for technical or other services rendered to other organisations.

TABLE 8 Production of certain principal products of the industry by larger establishments, 1963 and 1968

This table is not applicable to this industry.

TABLE 9 Purchases by larger establishments of selected principal products of the industry, 1968

This table is not applicable to this industry.

TABLE 10 Purchases by larger establishments in the industry, 1963 and 1968

Establishments employing 25 or more persons: Analysis of returns received, United Kingdom

	1963		1968	
	Quantity	Cost	Quantity	Cost
Materials for use in production	Th.tons	£'000	Th.tons	£'000
Steel bars and rods (including wire rods), angles, shapes and sections, girders, beams, joists and pillars rolled (not fabricated), including tube rounds and squares	10.1	892	16.9	1,911
	..	219	..	809
Iron and steel not elsewhere specified except finished parts, wire and scrap	17.9	1,362	28.8	3,411
	..	322	..	1,969
Light metals and non-ferrous metals in all forms except finished parts, wire and scrap				
Aluminium and aluminium alloys	..	1,684	5.7	2,193
			..	1,115
Brass and other copper alloys (including nickel silver and cupro-nickel, but excluding all other nickel alloys and cadmium copper) (a)	8.7	2,827	8.3	4,212
	..	473	..	1,591
Gold and rolled gold	..	(b)	..	229
Silver and manufactures of silver	..	260	..	232
General chemicals (c)				
Inorganic (including inorganic gases)			..	244
Organic (including organic gases)	..	367	..	50
Other (eg mixtures of inorganic and organic chemicals)			..	265
Synthetic resins and plastics materials (excluding leathercloth and reinforced plastics) (d)				
	Th.cwt.		Th.cwt.	
Phenolics and allied products; resins (the net resin content), solutions, emulsions, dispersions, moulding and extrusion compounds (e)	16.4	186	38.0	543
	..	196	..	279
Thermosetting polyesters, including epoxide resins (the net resin content excluding filler) and resin glass fibre mixtures (f)	7.4	92	2.6	84
	..	16	..	143
Manufactures wholly or mainly of rubber and synthetic rubber (including sheeting, but excluding replacement parts for firms' own machinery, plant and vehicles, etc)	..	198	..	562
Optical glass (including glass for spectacle lenses) in unworked form	0.6	88	1.7	328
	..	104	..	378
Semi-finished blanks for lenses (including bifocal and multi-focal blanks)	..	144	..	389
Finished lenses optically worked	..	275	..	195
Cases for holding instruments, appliances, etc (other than boxes, cartons and other packaging materials)	..	279	..	706
Components, parts and accessories and semi-manufactured goods, not elsewhere specified				
	Thousands		Thousands	
Electrical (other than parts of clocks) (g)				
Motors	91.2	1,131	52.6	582
	..	410	..	913
Valves (electronic) and semi-conductor devices	3,271	1,358	9,110	3,527
	..	1,654	..	2,257
Other	..	7,125	..	28,481
Wholly or partly of plastics materials (other than electrical)	..	912	..	1,780
Parts of clocks (excluding plastic parts)	..	(b)	..	324
Other	..	17,570	..	31,854
	Th.gal.		Th.gal.	
	178	50	221	82
Lubricating oils and greases (including cutting oils and emulsions)	Th.cwt.		Th.cwt.	
	0.3	2	0.6	9
	..	62	..	30

TABLE 10 (continued)

	1963		1968	
	Quantity	Cost	Quantity	Cost
Materials for use in production (continued)		£'000		£'000
Replacement parts for firms' own machinery, plant and vehicles, and accessories and consumable tools bought as replacement				
Tyres and other spare parts for firms' own road goods vehicles	..	1,222	..	110
Other	..		..	1,903
All other materials for use in production	..	15,063	..	10,254
Packaging materials				
Paper and board				
Boxes, cartons, drums and canisters (with or without metal ends) of paper and cardboard	..	649	..	707
Fibreboard packing cases			..	144
Wrapping and packing paper (including paper coated with plastics and any laminates incorporating paper but not metal)	..	112	..	128
Plastics (other than transparent regenerated cellulose film)	..	(b)	..	145
All other packaging materials	..	519	..	532
Fuel and electricity (h)				
	Th.tons			
Coal	10.8	80	..	170
	..	35		
			Th.tons	
Coke (including screenings) and manufactured fuel	4.6	44	2.3	28
	..	10	..	11
	Th.gal.		Th.gal.	
Derv fuel and motor spirit for use in road vehicles	883	181	1,302	375
	..	55	..	125
Other liquid fuels (including creosote/pitch mixtures, etc and liquefied petroleum gases)	6,781	300	5,151	284
	..	43	..	168(i)
	Th.therms		Th.therms	
Gas	3,770	271	6,461	511
	..	131		
	Th.kWh		Th.kWh	
Electricity	107,690	751	290,865	2,373
	..	458		
Total cost of materials and fuel		60,184		109,644
Goods purchased for merchanting		12,356		16,542
Canteen purchases		786		1,187
Total cost of purchases		73,326		127,373

(a) Cadmium copper was not specifically excluded for 1963.

(b) Not recorded separately for 1963.

(c) For 1963 described as 'Heavy chemicals (acids, alkalis, alcohols, other inorganic (including silver nitrate) and organic chemicals, compressed gases, etc)'.

(d) Film base was specifically excluded for 1963.

(e) For 1963 described as 'Phenolics and cresylics; resins, solutions, emulsions, dispersions, moulding and extrusion compounds'.

(f) For 1963 the net resin content excluding filler was not stipulated.

(g) Parts of clocks were not specifically excluded for 1963.

(h) There were no entries recorded for electricity generated in firms' own establishments in this industry in 1963. Owing to the risk of disclosure of information relating to individual firms the quantity for 1968 cannot be given.

(i) For 1968 may include a small amount of fuels not covered by specific headings.

TABLE 11 Transport costs and employment of larger establishments, 1963 and 1968

Establishments employing 25 or more persons:
Analysis of returns received, United Kingdom

	Unit	1963	1968
Average number mainly employed on transport	No.	523	698
Transport costs			
Wages and salaries	£'000	390	678
Derv fuel and motor spirit	"	236	501
Tyres and other spare parts for road goods vehicles	"	..	110
Payments to other organisations for transport	{ by road { by rail and other means excluding postal services	767	841
			746
Costs of operating road goods vehicles			
Insurance	"	44	74
Vehicle licences	"	25	62
Depreciation	"	183	423
Payments to other organisations for repairs and maintenance	"	79	187
Total	"	1,725(a)	3,622

(a) Excluding tyres and other spare parts for road goods vehicles, not collected separately for 1963.

TABLE 12 Payments for certain services, etc by larger establishments, 1963 and 1968 (a)

Establishments employing 25 or more persons:
Analysis of returns received, United Kingdom

	Amounts payable	
	1963	1968
Repairs and maintenance to	£'000	£'000
Buildings	340	650
Road goods vehicles	79	187
Plant, machinery and other capital equipment	416	1,052
Insurance, licensing and depreciation of road goods vehicles (b)	253	559
Rates, excluding water rates	1,247	2,516
Hire of plant and machinery	358	1,014
Postage, telephone, telegrams, cables and telex (c)	1,175	2,329
Total	3,869	8,307

(a) No deduction is made for these payments to arrive at the figures of net output given in this report.

(b) For details see Table 11.

(c) Excluding telex for 1963.

TABLE 13 Percentage analysis of twelve-month periods covered by returns from larger establishments, 1968

Establishments employing 25 or more persons:
Analysis of returns received, United Kingdom

Year ended	Percentage of total returns received	Percentage of total number employed
1968	Per cent.	Per cent.
April (a)	3.2	1.4
May	2.9	1.6
June	5.1	3.1
July	1.9	1.4
August	3.8	4.7
September	5.9	5.3
October	3.8	2.2
November	1.9	1.3
December	36.7	37.6
1969		
January	3.2	2.8
February	1.6	0.8
March	27.9	37.3
April (b)	2.1	0.5
	100	100

(a) From 6 April.

(b) To 5 April.

