

1992 Census of Manufactures

MC92-I-38A

INDUSTRY SERIES

Search and Navigation Equipment and Engineering, Measuring, Controlling, and Optical Instruments

Industries 3812, 3821, 3822, 3823, 3824,
3825, 3826, 3827, and 3829



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U.S. Department of Commerce
Ronald H. Brown, Secretary
David J. Barram, Deputy Secretary

Economics and Statistics Administration
Everett M. Ehrlich, Under Secretary
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BUREAU OF THE CENSUS
Martha Farnsworth Riche, Director

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Manufacturing and Construction Division prepared this report. **David W. Cartwright**, Assistant Chief for Census and Related Programs, was responsible for the overall planning, management, and coordination of the census of manufactures. Planning and implementation were under the direction of **Bruce M. Goldhirsch**, Chief, Electrical and Transportation Branch, assisted by **Raphael S. Corrado**, Section Chief, with primary staff assistance by **Indrek S. Grabbi**.

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If you have any questions concerning the statistics in this report, call 301-457-4817.



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Introduction to the Economic Census

PURPOSES AND USES OF THE ECONOMIC CENSUS

The economic census is the major source of facts about the structure and functioning of the Nation's economy. It provides essential information for government, business, industry, and the general public.

The economic census furnishes an important part of the framework for such composite measures as the gross domestic product, input/output measures, production and price indexes, and other statistical series that measure short-term changes in economic conditions.

Policymaking agencies of the Federal Government use the data, especially in monitoring economic activity and providing assistance to business.

State and local governments use the data to assess business activities and tax bases within their jurisdictions and to develop programs to attract business.

Trade associations study trends in their own and competing industries and keep their members informed of market changes.

Individual businesses use the data to locate potential markets and to analyze their own production and sales performance relative to industry or area averages.

AUTHORITY AND SCOPE

Title 13 of the United States Code (sections 131, 191, and 224) directs the Census Bureau to take the economic census every 5 years, covering years ending in 2 and 7. The 1992 Economic Census consists of the following eight censuses:

- Census of Retail Trade
- Census of Wholesale Trade
- Census of Service Industries
- Census of Financial, Insurance, and Real Estate Industries
- Census of Transportation, Communications, and Utilities
- Census of Manufactures
- Census of Mineral Industries
- Census of Construction Industries

Special programs also cover enterprise statistics and minority-owned and women-owned businesses. (The 1992 Census of Agriculture and 1992 Census of Governments are conducted separately.) The next economic census is scheduled to be taken in 1998 covering the year 1997.

AVAILABILITY OF THE DATA

The results of the economic census are available in printed reports for sale by the U.S. Government Printing Office and on compact discs for sale by the Census Bureau. Order forms for all types of products are available on request from Customer Services, Bureau of the Census, Washington, DC 20233-8300. A more complete description of publications being issued from this census is on the inside back cover of this document.

Census facts are also widely disseminated by trade associations, business journals, and newspapers. Volumes containing census statistics are available in most major public and college libraries. Finally, State data centers in every State as well as business and industry data centers in many States also supply economic census statistics.

WHAT'S NEW IN 1992

The 1992 Economic Census covers more of the economy than any previous census. New for 1992 are data on communications, utilities, financial, insurance, and real estate, as well as coverage of more transportation industries. The economic, agriculture, and governments censuses now collectively cover nearly 98 percent of all economic activity.

Among other changes, new 1992 definitions affect the boundaries of about a third of all metropolitan areas. Also, the Survey of Women-Owned Businesses has now been expanded to include all corporations.

HISTORICAL INFORMATION

The economic census has been taken as an integrated program at 5-year intervals since 1967 and before that for 1963, 1958, and 1954. Prior to that time, the individual subcomponents of the economic census were taken separately at varying intervals.

The economic census traces its beginnings to the 1810 Decennial Census, when questions on manufacturing were included with those for population. Coverage of economic activities was expanded for 1840 and subsequent censuses to include mining and some commercial activities. In 1902, Congress established a permanent Census Bureau and directed that a census of manufactures be taken every 5 years. The 1905 Manufactures Census was the first time a census was taken apart from the regular every-10-year population census.

The first census of business was taken in 1930, covering 1929. Initially it covered retail and wholesale trade and construction industries, but it was broadened in 1933 to include some of the service trades.

The 1954 Economic Census was the first census to be fully integrated—providing comparable census data across economic sectors, using consistent time periods, concepts, definitions, classifications, and reporting units. It was the first census to be taken by mail, using lists of firms provided by the administrative records of other Federal agencies. Since 1963, administrative records also have been used to provide basic statistics for very small firms, reducing or eliminating the need to send them census questionnaires. The Enterprise Statistics Program, which publishes combined data from the economic census, was made possible with the implementation of the integrated census program in 1954.

The range of industries covered in the economic censuses has continued to expand. The census of construction industries began on a regular basis in 1967, and the scope of service industries was broadened in 1967, 1977, and 1987. The census of transportation began in 1963 as a set of surveys covering travel, transportation of commodities, and trucks, but expanded in 1987 to cover business establishments in several transportation industries. For 1992, these statistics are incorporated into a broadened census of transportation, communications, and utilities. Also new for 1992 is the census of financial, insurance, and real estate industries. This is part of a gradual expansion in coverage of industries previously subjected to government regulation.

The Survey of Minority-Owned Business Enterprises was first conducted as a special project in 1969 and was incorporated into the economic census in 1972 along with the Survey of Women-Owned Businesses.

An economic census has also been taken in Puerto Rico since 1909, in the Virgin Islands of the United States and Guam since 1958, and in the Commonwealth of the Northern Mariana Islands since 1982.

Statistical reports from the 1987 and earlier censuses provide historical figures for the study of long-term time series and are available in some large libraries. All of the census data published since 1967 are still available for sale on microfiche from the Census Bureau.

AVAILABILITY OF MORE FREQUENT ECONOMIC DATA

While the census provides complete enumerations every 5 years, there are many needs for more frequent data as well. The Census Bureau conducts a number of monthly, quarterly, and annual surveys, with the results appearing in publication series such as Current Business Reports (retail and wholesale trade and service industries), the Annual Survey of Manufactures, Current Industrial Reports, and the Quarterly Financial Report. Most of these surveys, while providing more frequent observations, yield less kind-of-business and geographic detail than the census. The County Business Patterns program offers annual statistics on the number of establishments, employment, and payroll classified by industry within each county.

SOURCES FOR MORE INFORMATION

More information about the scope, coverage, classification system, data items, and publications for each of the economic censuses and related surveys is published in the *Guide to the 1992 Economic Census and Related Statistics*. More information on the methodology, procedures, and history of the census will be published in the *History of the 1992 Economic Census*. Contact Customer Services for information on availability.

Census of Manufactures

GENERAL

This report, from the 1992 Census of Manufactures, is one of a series of 83 industry reports, each of which provides statistics for individual industries or groups of related industries. Additional separate reports will be issued for each State and the District of Columbia and for special subjects such as manufacturers' shipments to the federal government and concentration ratios in manufacturing.

The industry reports include such statistics as number of establishments, employment, payroll, value added by manufacture, cost of materials consumed, capital expenditures, product shipments, etc.

State reports present similar statistics for each State and its important metropolitan areas (MA's), counties, and places. Selected statistical totals for "all manufacturing" have been shown in the State reports for MA's with 250 employees or more and for counties and places with 500 employees or more.

The *General Summary* report contains industry, product class, and geographic area statistics summarized in one report. The introduction to the *General Summary* discusses, at greater length, many of the subjects described in this introduction. For example, the *General Summary* text discusses the relationship of value added by manufacture to national income by industry of origin, the changes in statistical concepts over the history of the censuses, and the valuation problems arising from intracompany transfers between manufacturing plants of a company and between manufacturing plants and sales offices and sales branches of a company.

SCOPE OF CENSUS AND DEFINITION OF MANUFACTURING

The 1992 Census of Manufactures covers all establishments with one paid employee or more primarily engaged in manufacturing as defined in the *1987 Standard Industrial Classification (SIC) Manual*¹. This is the system of industrial classification developed by experts on classification in Government and private industry under the guidance of the Office of Information and Regulatory Affairs, Office of

¹*Standard Industrial Classification Manual: 1987*. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Management and Budget. This classification system is used by Government agencies as well as many organizations outside the Government.

The SIC Manual defines manufacturing as the mechanical or chemical transformation of substances or materials into new products. The assembly of component parts of products also is considered to be manufacturing if the resulting product is neither a structure nor other fixed improvement. These activities are usually carried on in plants, factories, or mills that characteristically use power-driven machines and materials-handling equipment.

Manufacturing production is usually carried on for the wholesale market, for transfers to other plants of the same company, or to the order of industrial users rather than for direct sale to the household consumer. Some manufacturers in a few industries sell chiefly at retail to household consumers through the mail, through house-to-house routes, or through salespersons. Some activities of a service nature (enameling, engraving, etc.) are included in manufacturing when they are performed primarily for trade. They are considered nonmanufacturing when they are performed primarily to the order of the household consumer.

RELATIONSHIP BETWEEN ANNUAL SURVEY OF MANUFACTURES AND CENSUS OF MANUFACTURES

The Bureau of the Census conducts the annual survey of manufactures (ASM) in each of the 4 years between the censuses of manufactures. The ASM is a probability-based sample of approximately 62,000 establishments and collects the same industry statistics (employment, payroll, value of shipments, etc.) as the census of manufactures. In addition to collecting the information normally requested on the census form, the establishments in the ASM sample are requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, costs of purchased services, and foreign content of materials consumed. Except for supplemental labor costs, the extra ASM items are collected only in census years.

ESTABLISHMENT BASIS OF REPORTING

The census of manufactures is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each

location. The ASM also is conducted on an establishment basis, but separate reports are filed for just those establishments selected in the sample. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

In 1992, as in earlier years, a minimum size limit was set for inclusion of establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures except for data on number of establishments for a few industries. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company (see Auxiliaries).

MANUFACTURING UNIVERSE AND CENSUS REPORT FORMS

The 1992 Census of Manufactures universe includes approximately 380,000 establishments. The amounts of information requested from manufacturing establishments were dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the annual survey of manufactures. The methods of obtaining information for the various subsets of the universe to arrive at the aggregate figures shown in the publication are described below:

1. **Small single-establishment companies not sent a report form.** In the 1992 Census of Manufactures, approximately 143,000 small single-establishment companies were excused from filing reports. Selection of these small establishments was done on an industry-by-industry basis and was based on annual payroll and total shipments data as well as on the industry classification codes contained in the administrative records of Federal agencies. The cutoffs were selected so that these administrative-records cases would account for no more than 3 percent of the value of shipments for all manufacturing. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed forms.

Information on the physical location of the establishment, as well as information on payrolls, receipts (shipments), and industry classification, was obtained from the administrative records of other Federal agencies under special arrangements, which safeguarded their confidentiality. Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials

were not distributed among specific products and materials for these establishments but were included in the product and material "not specified by kind" (n.s.k.) categories.

The industry classification codes included in the administrative-records files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded at the four-digit SIC level. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes these administrative-records cases were only given a two- or three-digit SIC group. For the 1992 Census of Manufactures, these establishments were sent a separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the four-digit SIC level. Establishments that did not return the classification form were coded later to those four-digit SIC industries identified as "not elsewhere classified" (n.e.c.) within the given two- or three-digit industry groups.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassification has no significant effect on the statistics other than on the number of companies and establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

2. **Establishments sent a report form.** The over 237,000 establishments covered in the mail canvass were divided into three groups:

- a. **ASM sample establishments.** This group consisted of approximately 62,000 establishments covering all the units of large manufacturing establishments as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size (see Appendix B, Annual Survey of Manufactures).

In a census of manufactures year, the ASM report form (MA-1000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll, and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services. See appendix A, section 2, for an explanation of these items.

The census part of the report form is 1 of approximately 200 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of these many forms to canvass the 459 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries as well as secondary products and miscellaneous services that establishments classified in these industries were likely to be performing. Respondents were requested to identify the products, the value of each product, and, in a large number of cases, the quantity of the product shipped during the survey year. Space also was provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided for the respondent to describe significant material not identified on the form.

Finally, a wide variety of special inquiries was included to measure activities peculiar to a given industry, such as operations performed and equipment used.

- b. **Large and medium establishments (non-ASM).** Approximately 112,000 establishments were included in this group. A variable cutoff, based on administrative-records payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive 1 of the approximately 200 census of manufactures regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.
- c. **Small single-establishment companies (non-ASM).** This group consisted of approximately 63,000 establishments. For those industries where application of the variable cutoff for administrative-records cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated or "short" form was used. These establishments received 1 of the approximately 80 versions of the short form, which requested summary product and

material data and totals but no details on employment, payrolls, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics; the same data were collected on the short form as on the long form. However, detailed information on materials consumed was not collected on the short form; thus its use would increase the value of the n.s.k. categories.

AUXILIARIES

In this industry report, the data on employment and payroll are limited to operating manufacturing establishments. The census report form filed for auxiliaries (ES-9200) requested a description of the activity of the establishments serviced. However, the manufacturing auxiliaries were coded only to the two-digit major group of the establishments they served; whereas, the operating establishments were coded to a four-digit manufacturing industry. Data for the approximately 11,000 separately operated auxiliaries are included in the geographic area series and in a report issued as part of the 1992 Enterprise Statistics Survey.

Auxiliaries are establishments whose employees are primarily engaged in performing supporting services for other establishments of the same company, rather than for the general public or for other business firms. They can be at different locations from the establishments served or at the same location as one of those establishments but not operating as an integral part thereof and serving two establishments or more. Where auxiliary operations are conducted at the same location as the manufacturing operation and operate as an integral part thereof, they usually are included in the report for the operating manufacturing establishment.

Included in the broad category of auxiliaries are administrative offices. Employees in administrative offices are concerned with the general management of multiestablishment companies, i.e., with the general supervision and control of two units or more, such as manufacturing plants, mines, sales branches, or stores. The functions of these employees may include the following:

1. Program planning, including sales research and coordination of purchasing, production, and distribution
2. Company purchasing, including general contracts and purchasing methods
3. Company financial policy and accounting
4. General engineering, including design of product machinery and equipment, and direction of engineering effort conducted at the individual operation locations
5. Company personnel matters
6. Legal and patent matters

Other types of auxiliaries serving the plants or central management of the company include purchasing offices, sales promotion offices, research and development organizations, etc.

INDUSTRY CLASSIFICATION OF ESTABLISHMENTS

Each of the establishments covered in the census was classified in 1 of 459 manufacturing industries in accordance with the industry definitions in the 1987 SIC Manual. The 1987 edition of this manual represents a major revision for manufacturing industries from the 1972 edition and its 1977 supplement. Appendix A of the 1987 Manual notes the revisions in the four-digit industry levels between 1972/77 and 1987.

An industry is generally defined as a group of establishments producing the same product or a closely related group of products. The product groupings from which industry classifications are derived are based on considerations such as similarity of manufacturing processes, types of materials used, types of customers, and the like. The resulting group of establishments must be significant in terms of number, value added by manufacture, value of shipments, and number of employees. The system operates in such a way that the definitions progressively become narrower with successive additions of numerical digits. For 1992, there are 20 major groups (two-digit SIC), 139 industry groups (three-digit SIC), and 459 industries (four-digit SIC). This represents an expansion of four-digit industries from 452 in 1972/77 and a reduction of three-digit groups from 143 in 1972/77. Product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are about 11,000 products identified by a seven-digit code. The seven-digit products are considered the primary products of the industry with the same four digits.

Accordingly, an establishment is usually classified in a particular industry on the basis of its major activity during a particular year, i.e., production of the products primary to that industry exceeds, in value, production of the products primary to any other single industry. In a few instances, however, the industry classification of an establishment is not only determined by the products it makes but also by the process employed in operations. Refining of nonferrous metals from ore or rolling and drawing of nonferrous metals (processes which involve heavy capitalization in specialized equipment) would be classified according to the process used during a census year. These establishments then would be "frozen" in that industry during the following ASM years.

In either a census or ASM year, establishments included in the ASM sample with certainty weight, other than those involved with heavily capitalized activities described above, are reclassified by industry only if the change in the primary activity from the prior year is significant or if the change has occurred for 2 successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year (see Appendix B, Annual Survey of Manufactures). However, in the following census year, these ASM plants are allowed to shift from one industry to another.

The results of these rules covering the switching of plants from one industry classification to another are that, at the aggregate level, some industries comprise different mixes of establishments between survey years and establishment data for such industry statistics as employment and payroll may be tabulated in different industries between survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the four-digit SIC level, should be viewed with caution. This is particularly true for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-records cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of companies and establishments.

While some establishments produce only the primary products of the industry in which they are classified, all establishments of an industry rarely specialize to this extent. The industry statistics (employment, inventories, value added by manufacture, total value of shipments including resales and miscellaneous receipts, etc.) shown in tables 1a through 5a, therefore, reflect not only the primary activities of the establishments in that industry but also their secondary activities. The product statistics in table 6a represent the output of all establishments whether or not they are classified in the same industry as the product. For this reason, in relating the industry statistics, especially the value of shipments to the product statistics, the composition of the industry's output shown in table 5b should be considered.

The extent to which industry and product statistics may be matched with each other is measured by two ratios which are computed from the figures shown in table 5b. The first of these ratios, called the primary product specialization ratio, measures the proportion of product shipments (both primary and secondary) of the establishments classified in the industry represented by the primary products of those establishments. The second ratio, called the coverage ratio, is the proportion of primary products shipped by the establishments classified in the industry to total shipments of such products by all manufacturing establishments.

However, establishments making products falling into the same industry category may use a variety of processes and materials to produce them. Also, the same industry classification (based on end products) may include both establishments that are highly integrated and those that

put only the finishing touches on an already highly fabricated item. For example, the refrigeration equipment industry includes instances of almost complete integration (production of the compressor, condensing unit, electric motor, casting, stamping of the case, and final assembly) all carried on at one plant. On the other hand, the condensing unit, the motor, and the case may be purchased and only assembled into the finished product.

In some instances, separate industry categories have been established for integrated and nonintegrated establishments. For other industries, the census provides separate statistics on the production of intermediate commodities made and used in the producing plant. For some industries characterized by many plants of the same company, separate figures on interplant transfers of products usually are shown.

Differences in the integration of production processes, types of operations, and alternatives in types of materials used should be considered when relating the industry statistics (employment, payrolls, value added, etc.) to the product and material data.

VALUE OF SHIPMENTS FOR THE INDUSTRY COMPARED WITH VALUE OF PRODUCT SHIPMENTS

This report shows value of shipments data for industries and products. In tables 1a through 5b, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Value of product shipments shown in table 6a represents the total value of all products shipped that are classified as primary to an industry.

CENSUS DISCLOSURE RULES

In accordance with Federal law governing census reports, no data are published that would disclose the data for an individual establishment or company. However, the number of establishments classified in a specific industry is not considered a disclosure, so this information may be released even though other information is withheld.

The disclosure analysis for the industry statistics in tables 1a through 5a of this report is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line is suppressed except for new capital expenditures. However, the suppressed data are included in higher-level totals. A separate disclosure analysis is performed for new capital expenditures that can be suppressed even though value of shipments data are publishable.

SPECIAL TABULATIONS

Special tabulations of data collected in the 1992 Census of Manufactures may be obtained on computer diskette or in tabular form. The data will be in summary form and subject to the same rules prohibiting disclosure of confidential information (including name, address, kind of business, or other data for individual business establishments or companies) as are the regular publications.

Special tabulations are prepared on a cost basis. A request for a cost estimate, as well as exact specifications on the type and format of the data to be provided, should be directed to the Chief, Manufacturing and Construction Division, Bureau of the Census, Washington, DC 20233.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in this publication:

- Represents zero.
- (D) Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
- (NA) Not available.
- (NC) Not comparable.
- (S) Withheld because estimate did not meet publication standards.
- (X) Not applicable.
- (Z) Less than half the unit shown.
- n.e.c. Not elsewhere classified.
- n.s.k. Not specified by kind.
- pt. Part.
- r Revised.
- SIC Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

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SIC's 357, 36-39	Bruce Goldhirsch	301-457-4817
Import/ export publications	Foreign Trade Division	301-457-3041
Industry analysis and forecasting	International Trade Administration	202-377-4356

Users' Guide for Locating Statistics in This Report by Table Number

For explanation of terms, see appendixes

Item	Four-digit industry statistics							Five-digit product class and seven-digit product statistics			
	Historical	Operating ratios	By geographic area	Summary and supplemental	By employment size	By industry and product class specialization	Materials consumed by kind	Industry-product analysis	Product shipments	Product class by geographic area	Historical product class
Number of companies	1a			3a					*6a		
Number of establishments	1a		2	3a	4	5a					
Employment and payroll:											
Number of employees	1a	1b	2	3a	4	5a					
Payroll	1a	1b	2	3a	4	5a					
Supplemental labor costs				3a							
Production workers	1a	1b	2	3a	4	5a					
Production-worker hours	1a	1b	2	3a	4	5a					
Production-worker wages	1a	1b	2	3a	4	5a					
Shipments, cost of materials, and value added:											
Value of shipments (four-digit)	1a	1b	2	3a	4	5a		5b			
Product class shipments (five-digit)									6a	6b	6c
Product shipments (seven-digit)									6a		
Value added by manufacture	1a	1b	2	3a	4	5a					
Cost of materials	1a	1b	2	3a	4	5a					
Fuels and electric energy				3a							
Materials consumed by kind							7				
Inventories:											
Total, end of year	1a			3a	4						
By stage of fabrication				3a							
Capital expenditures, assets, rental payments, and purchased services:											
New capital expenditures	1a		2	3b	4	5a					
Used plant and equipment expenditures				3b							
Gross assets				3b							
Depreciation				3b							
Retirements of buildings and machinery				3b							
Rental payments				3b							
Foreign content of materials consumed				3c							
Purchased services				3c							
Ratios:											
Specialization	1a							5b			
Coverage	1a							5b			

*Number of companies with shipments of more than \$100 thousand.

Contents

Search and Navigation Equipment and Engineering, Measuring, Controlling, and Optical Instruments

[Page numbers listed here omit the prefix that appears as part of the number of each page]

	Page
Introduction to the Economic Census.....	III
Census of Manufactures	V
Users' Guide for Locating Statistics in This Report by Table Number	X
Description of Industries and Summary of Findings	3

TABLES

Industry Statistics

1a. Historical Statistics for the Industry: 1992 and Earlier Years	9
1b. Selected Operating Ratios for the Industry: 1992 and Earlier Years	10
2. Industry Statistics for Selected States: 1992 and 1987	12
3a. Summary Statistics for the Industry: 1992	16
3b. Gross Book Value of Depreciable Assets, Capital Expenditures, Retirements, Depreciation, and Rental Payments: 1992	17
3c. Supplemental Industry Statistics Based on Sample Estimates: 1992	17
4. Industry Statistics by Employment Size of Establishment: 1992	18
5a. Industry Statistics by Industry and Primary Product Class Specialization: 1992 ...	20

Product Statistics

5b. Industry-Product Analysis-Value of Industry and Primary Product Shipments; Specialization and Coverage Ratios: 1992 and Earlier Census Years	21
6a. Product and Product Classes-Value of Shipments by All Producers: 1992 and 1987	24
6b. Product Classes-Value of Shipments by All Producers for Specified States: 1992 and 1987	26
6c. Historical Statistics for Product Classes-Value Shipped by All Producers: 1992 and Earlier Years	27

Material Statistics

7. Materials Consumed by Kind: 1992 and 1987	28
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APPENDIXES

A. Explanation of Terms	A-1
B. Annual Survey of Manufactures Sampling and Estimating Methodologies	B-1
C. Product Code Reference Tables	C-1

Publication Program.....	Inside back cover
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Description of Industries and Summary of Findings

This report shows 1992 Census of Manufactures statistics for establishments classified in each of the following industries:

SIC code and title

3812	Search and Navigation Equipment
3821	Laboratory Apparatus and Furniture
3822	Environmental Controls
3823	Process Control Instruments
3824	Fluid Meters and Counting Devices
3825	Instruments to Measure Electricity
3826	Analytical Instruments
3827	Optical Instruments and Lenses
3829	Measuring and Controlling Devices, N.E.C.

The industry statistics (employment, payroll, cost of materials, value of shipments, inventories, etc.) are reported for each establishment as a whole. Aggregates of such data for an industry reflect not only the primary activities of the establishments but also their activities in the manufacture of secondary products as well as their miscellaneous activities (contract work on materials owned by others, repair work, etc.). This fact should be taken into account in comparing industry statistics (tables 1 through 5a) with product statistics (table 6) showing shipments by all industries of the primary products of the specified industry. The extent of the "product mix" is indicated in table 5b, which shows the value of primary and secondary products shipped by establishments classified in the specified industry and the value of primary products of the industry shipped as secondary products by establishments classified in other industries.

Establishment data were tabulated based on industry definitions included in the *1987 Standard Industrial Classification (SIC) Manual*¹. The 1987 edition represents a major revision for manufacturing industries from the 1972 edition and its 1977 supplement. In addition to the 1987 SIC revision, changes were made to the product class (five-digit) and product code (seven-digit) categories. The

product class and product code comparability between the 1992 and 1987 censuses is shown in appendix C. This appendix presents, in tabular form, the linkage from 1992 to 1987, and 1987 to 1992.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT

This industry is made up of establishments primarily engaged in manufacturing search, detection, navigation, guidance, aeronautical, and nautical systems and instruments. Important products of this industry are radar systems and equipment; sonar systems and equipment; navigation systems and equipment; countermeasures equipment; aircraft and missile control systems and equipment; flight and navigation sensors, transmitters, and display; gyroscopes; airframe equipment instruments; and speed, pitch, and roll navigational instruments and systems. Establishments primarily engaged in manufacturing aircraft engine instruments or meteorological systems and equipment, including weather tracking equipment, are classified in industry 3829. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3812, Search and Navigation Equipment, had employment of 255.0 thousand. The employment figure was 31 percent below the 369.4 thousand reported in 1987. Compared with 1991, employment decreased 9 percent. The 1991 data are based on the Census Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The leading States in employment in 1992 were California, Texas, New York, and Florida, accounting for approximately 51 percent of the industry's employment. These same States were the leaders in 1987 when they accounted for 53 percent of the industry's employment.

¹*Standard Industrial Classification Manual: 1987*. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

The total value of shipments for establishments classified in this industry was \$35.3 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3812 shipped \$30.0 billion of search and navigation equipment products considered primary to the industry, \$2.9 billion of secondary products, and had \$2.3 billion of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 91 percent (specialization ratio). In 1987, the specialization ratio was 89 percent.

Establishments in this industry also accounted for 87 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 90 percent.

The products primary to industry 3812, no matter in what industry they were produced, appear in table 6a and aggregate to \$34.4 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the search and navigation equipment industry amounted to \$10.1 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 4 percent of the total value of shipments.

INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE

This industry is made up of establishments primarily engaged in manufacturing laboratory apparatus and furniture. Important products of this industry include laboratory balances and scales, laboratory furnaces and ovens, laboratory centrifuges, and various components, parts, and accessories for laboratory apparatus. Laboratory instruments are classified elsewhere, generally in other industries of industry group 382. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3821, Laboratory Apparatus and Furniture, had employment of 17.7 thousand. The employment figure was 4 percent above the 17.1 thousand reported in 1987.

The leading States in employment in 1992 were California, Delaware, New Jersey, and Pennsylvania. This represents a shift from 1987 when California, New Jersey, Wisconsin, and Pennsylvania were the leading States.

The total value of shipments for establishments classified in this industry was \$2.1 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3821 shipped \$1.7 billion of laboratory apparatus and furniture products considered primary to the industry, \$277.5 million of secondary products, and had \$164.7 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 86 percent (specialization ratio). In 1987, the specialization ratio was 89 percent.

Establishments in this industry also accounted for 90 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 92 percent.

The products primary to industry 3821, no matter in what industry they were produced, appear in table 6a and aggregate to \$1.8 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the laboratory apparatus and furniture industry amounted to \$817.1 million. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 15 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 6 percent of the total value of shipments.

INDUSTRY 3822, ENVIRONMENTAL CONTROLS

This industry is made up of establishments primarily engaged in manufacturing temperature and related controls for heating and air-conditioning installations and refrigeration applications, which are electrically, electronically, or pneumatically actuated, and which measure and control variables such as temperature and humidity; and automatic regulators used as components of household appliances.

Establishments primarily engaged in manufacturing industrial process controls are classified in industry 3823; those manufacturing motor control switches are classified in industry 3625; those manufacturing switches for household appliances are classified in industry 3643; and those manufacturing appliance timers are classified in industry

3873. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3822, Environmental Controls, had employment of 25.0 thousand. The employment figure was 6 percent below the 26.5 thousand reported in 1987. Compared with 1991, employment increased 11 percent. The 1991 data are based on the Census Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The leading States in employment in 1992 were California, Illinois, Minnesota, and Ohio. These same States were the leaders in 1987.

The total value of shipments for establishments classified in this industry was \$2.6 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3822 shipped \$2.2 billion of environmental controls products considered primary to the industry, \$183.1 million of secondary products, and had \$261.9 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 92 percent (specialization ratio). In 1987, the specialization ratio also was 92 percent.

Establishments in this industry also accounted for 91 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 89 percent.

The products primary to industry 3822, no matter in what industry they were produced, appear in table 6a and aggregate to \$2.4 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the environmental control industry amounted to \$1.0 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 15 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 5 percent of the total value of shipments.

INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS

This industry is made up of establishments primarily engaged in manufacturing industrial instruments and related products for measuring, displaying (indicating and/ or recording), transmitting, and controlling process variables in manufacturing, energy conversion, and public service utilities. These instruments operate mechanically, pneumatically, electronically, or electrically to measure process variables, such as temperature, humidity, pressure, vacuum, combustion, flow, level, viscosity, density, acidity, alkalinity, specific gravity, gas and liquid concentration, sequence, time interval, mechanical motion, and rotation. Establishments primarily engaged in manufacturing electrical integrating meters are classified in industry 3825; those manufacturing residential and commercial comfort controls are classified in industry 3822; those manufacturing all liquid-in-glass and bimetal thermometers and glass hydrometers are classified in industry 3829; those manufacturing recorder charts are classified in industry group 275; and those manufacturing analytical and optical instruments are classified in industries 3826 and 3827. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3823, Process Control Instruments, had employment of 50.1 thousand. The employment figure was 6 percent below the 53.3 thousand reported in 1987.

The leading States in employment in 1992 were California, Pennsylvania, Ohio, and Massachusetts, accounting for approximately 47 percent of the industry's employment. This represents a shift from 1987 when Pennsylvania, California, Massachusetts, and Illinois accounted for approximately 46 percent of the industry's employment.

The total value of shipments for establishments classified in this industry was \$6.4 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3823 shipped \$5.3 billion of process control instrument products considered primary to the industry, \$403.3 million of secondary products, and had \$691.8 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 93 percent (specialization ratio). In 1987, the specialization ratio was 92 percent.

Establishments in this industry also accounted for 89 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 92 percent.

The products primary to industry 3823, no matter in what industry they were produced, appear in table 6a and aggregate to \$5.9 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the process control instruments industry amounted to \$2.1 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 15 percent of the total value of shipments.

INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES

This industry is made up of establishments primarily engaged in manufacturing totalizing (registering) meters monitoring fluid flows, such as watermeters and gasmeters; and producers of mechanical and electromechanical counters and associated metering devices. Establishments primarily engaged in manufacturing electricity integrating meters and electronic frequency counters are classified in industry 3825, and those manufacturing industrial process instruments are classified in industry 2823. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3824, Fluid Meters and Counting Devices, had employment of 16.2 thousand. The employment figure was 60 percent above the 10.1 thousand reported in 1987.

The leading States in employment in 1992 were Illinois, Michigan, Pennsylvania, and Wisconsin. This represents a shift from 1987 when Pennsylvania, Connecticut, Wisconsin, and North Carolina were the leading States.

The total value of shipments for establishments classified in this industry was \$2.6 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3824 shipped \$2.4 billion of fluid meters and counting device products considered primary to the industry, \$175.0 million of secondary products, and had \$59.7 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary

and primary products shipped by establishments in this industry was 93 percent (specialization ratio). In 1987, the specialization ratio was 95 percent.

Establishments in this industry also accounted for 87 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 76 percent.

The products primary to industry 3824, no matter in what industry they were produced, appear in table 6a and aggregate to \$2.7 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the fluid meters and counting devices industry amounted to \$1.1 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 4 percent of the total value of shipments.

INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY

This industry is made up of establishments primarily engaged in manufacturing instruments for measuring the characteristics of electricity signals, such as voltmeters, ammeters, wattmeters, watt-hour meters, demand meters, and equipment for testing the electrical characteristics of electrical, radio, and communication circuits and of internal combustion engines. Establishments primarily engaged in the manufacturing of electronic checkout, monitoring, evaluating, and other electronic support equipment for electronic navigational, radar, and sonar systems are classified in industry 3812, and those manufacturing similar equipment for communication systems classified in industry group 366. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3825, Instruments to Measure Electricity, had employment of 68.7 thousand. The employment figure was 19 percent below the 85.2 thousand reported in 1987.

The leading States in employment in 1992 were California, Massachusetts, New York, and Oregon. These same States were the leaders in 1987.

The total value of shipments for establishments classified in this industry was \$8.9 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3825 shipped \$7.5 billion of electricity measurement instrument products considered primary to the industry, \$454.6 million of secondary products, and had \$924.6 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 94 percent (specialization ratio). In 1987, the specialization ratio was 95 percent.

Establishments in this industry also accounted for 93 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 92 percent.

The products primary to industry 3825, no matter in what industry they were produced, appear in table 6a and aggregate to \$8.1 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the electricity measurement instruments industry amounted to \$3.1 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 11 percent of the total value of shipments.

INDUSTRY 3826, ANALYTICAL INSTRUMENTS

This industry is made up of establishments primarily engaged in manufacturing laboratory instruments and instrument systems for chemical or physical analysis of the composition or concentration of samples of solid, fluid, gaseous, or composite material. Establishments primarily engaged in manufacturing instruments for monitoring and analyzing continuous samples from medical patients are classified in industry 3845, and from industrial process streams are classified in industry 3823. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3826, Analytical Instruments, had employment of 39.7 thousand. The employment figure was 27 percent above the 31.2 thousand reported in 1987. Compared with 1991, employment increased 7 percent. The 1991 data are based on the

Census Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The leading States in employment in 1992 were California, Massachusetts, Florida, and Texas, accounting for approximately 59 percent of the industry's employment. These same States were the leaders in 1987.

The total value of shipments for establishments classified in this industry was \$5.2 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3826 shipped \$4.2 billion of analytical instrument products considered primary to the industry, \$481.6 million of secondary products, and had \$502.5 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 90 percent (specialization ratio). In 1987, the specialization ratio was 87 percent.

Establishments in this industry also accounted for 83 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 90 percent.

The products primary to industry 3826, no matter in what industry they were produced, appear in table 6a and aggregate to \$5.1 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the analytical instrument industry amounted to \$2.2 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 8 percent of the total value of shipments.

INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES

This industry is made up of establishments primarily engaged in manufacturing instruments and apparatus that measure an optical property and optically project, measure, or magnify an image, such as binoculars, microscopes, prisms, and lenses. Included are establishments primarily engaged in manufacturing optical sighting and fire control equipment. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3827, Measuring and Controlling Devices, N.E.C., had employment of 18.9 thousand. The employment figure was 6 percent below the 20.1 thousand reported in 1987. Compared with 1991, employment decreased 16 percent. The 1991 data are based on the Census Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

The leading States in employment in 1992 were California, Massachusetts, Connecticut, and New York, accounting for approximately 62 percent of the industry's employment. This represents a shift from 1987 when California, Massachusetts, New Hampshire, and Connecticut were the leading States.

The total value of shipments for establishments classified in this industry was \$2.3 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3827 shipped \$1.9 billion of optical instrument and lense products considered primary to the industry, \$230.3 million of secondary products, and had \$124.7 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 89 percent (specialization ratio). In 1987, the specialization ratio was 91 percent.

Establishments in this industry also accounted for 83 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 80 percent.

The products primary to industry 3827, no matter in what industry they were produced, appear in table 6a and aggregate to \$2.3 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the optical instruments and lenses industry amounted to \$836.0 million. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 10 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 6 percent of the total value of shipments.

INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.

This industry is made up of establishments primarily engaged in manufacturing measuring and controlling devices, not elsewhere classified, including meteorological instruments. Important products of this industry are physical

properties testing equipment, nuclear radiation detection and monitoring instrumentation, aircraft engine instruments (except flight), and liquid-in-glass and bimetal thermometers. Also included in this industry are establishments primarily engaged in manufacturing surveying and drafting instruments, such as alidades, transits, sextants, theodolites, slide rules, and T-squares. Products of this industry also are collected in the Current Industrial Report (CIR) MA-38B, Selected Instruments and Related Products. For information regarding the CIR, see Contacts for Data Users at the end of the Census of Manufactures section.

The 1992 definition of this industry is the same as that used in the 1987 Standard Industrial Classification (SIC) system. The SIC number and title also are the same.

In the 1992 Census of Manufactures, Industry 3829, Measuring and Controlling Devices, N.E.C., had employment of 38.1 thousand. The employment figure was 7 percent below the 41.0 thousand reported in 1987.

The leading States in employment in 1992 were California, Texas, Ohio, and Pennsylvania, accounting for approximately 42 percent of the industry's employment. This represents a shift from 1987 when California, Ohio, New York, and Massachusetts were the leading States.

The total value of shipments for establishments classified in this industry was \$4.4 billion.

Establishments in virtually all industries ship secondary products as well as products primary to the industry in which they are classified and have some miscellaneous receipts, such as resales and contract receipts. Industry 3829 shipped \$3.6 billion of measuring and controlling devices, not elsewhere classified, products considered primary to the industry, \$351.3 million of secondary products, and had \$493.5 million of miscellaneous receipts, resales, and contract work. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in this industry was 91 percent (specialization ratio). In 1987, the specialization ratio was 86 percent.

Establishments in this industry also accounted for 82 percent of products considered primary to the industry no matter where they were actually produced (coverage ratio). In 1987, the coverage ratio was 80 percent.

The products primary to industry 3829, no matter in what industry they were produced, appear in table 6a and aggregate to \$4.3 billion. For further explanation of specialization and coverage ratios, see table 5b and the appendixes.

The total cost of materials, services, and fuels and energy used by establishments classified in the measuring and controlling devices, not elsewhere classified, industry amounted to \$1.6 billion. Data on specific materials consumed appear in table 7.

Single-establishment companies in this industry with less than 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 9 percent of the total value of shipments.

Table 1a. Historical Statistics for the Industry: 1992 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year ¹	All establishments ³			All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Cost of materials ⁵ (million dollars)	Value of shipments (million dollars)	New capital expenditures ⁶ (million dollars)	End-of-year inventories ⁴ (million dollars)	Ratios	
	Companies ² (no.)	Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Specialization ⁷ (per cent)	Coverage ⁸ (per cent)
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT															
1992 Census ---	634	769	409	255.0	11 056.2	103.6	203.1	3 511.8	24 411.1	10 115.8	35 266.1	859.1	7 408.2	91	87
1991 ASM -----	(NA)	(NA)	(NA)	279.8	11 630.7	112.3	218.0	3 633.3	23 672.3	11 401.5	36 213.4	829.9	7 780.4	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	313.6	12 257.9	130.3	256.7	4 080.2	24 931.9	11 275.3	36 733.5	1 124.5	8 686.4	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	339.5	12 445.3	140.8	276.7	4 147.3	23 924.5	10 874.7	35 295.4	1 366.9	9 153.9	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	361.3	12 547.3	155.3	297.1	4 452.6	24 666.7	11 510.2	36 596.4	1 368.6	9 187.0	(NA)	(NA)
1987 Census ---	918	1 084	507	369.4	12 368.0	158.8	314.4	4 466.8	24 738.7	12 208.3	36 266.8	1 439.0	9 454.6	89	90
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE															
1992 Census ---	330	342	143	17.7	571.6	9.0	18.4	213.9	1 314.9	817.1	2 106.0	55.4	376.2	86	90
1991 ASM -----	(NA)	(NA)	(NA)	14.8	485.7	6.9	14.6	166.6	1 100.1	650.5	1 782.5	52.7	294.0	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	17.8	529.4	9.1	19.1	206.2	1 209.7	682.2	1 916.7	59.5	372.0	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	18.2	519.0	9.8	20.3	214.6	1 238.7	728.0	1 969.8	58.1	417.0	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	19.3	531.5	11.2	23.2	235.3	1 301.9	777.3	2 068.8	66.1	433.9	(NA)	(NA)
1987 Census ---	246	260	124	17.1	440.9	9.6	19.2	195.2	1 142.4	639.8	1 769.3	52.3	398.3	89	92
INDUSTRY 3822, ENVIRONMENTAL CONTROLS															
1992 Census ---	294	318	130	25.0	685.4	16.8	32.1	356.0	1 633.0	997.1	2 607.1	81.3	409.9	92	91
1991 ASM -----	(NA)	(NA)	(NA)	22.5	615.2	14.9	27.7	312.6	1 297.7	892.4	2 243.7	56.0	372.5	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	26.1	664.8	18.2	35.2	366.9	1 461.6	934.2	2 396.0	61.2	449.6	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	25.4	613.7	18.2	35.4	361.6	1 471.5	889.0	2 336.3	66.3	421.3	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	27.1	643.8	19.5	38.0	383.3	1 444.3	861.4	2 291.1	57.0	402.6	(NA)	(NA)
1987 Census ---	230	254	106	26.5	602.4	18.6	36.2	357.3	1 302.7	760.0	2 068.8	66.3	374.0	92	89
1986 ASM -----	(NA)	(NA)	(NA)	25.8	575.6	18.5	35.7	350.3	1 278.2	687.3	1 990.4	49.8	335.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	27.1	580.9	19.5	36.9	355.9	1 318.2	669.8	1 989.3	63.6	366.5	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	28.2	574.2	20.9	38.5	359.0	1 303.6	684.2	1 966.1	57.9	377.0	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	27.9	539.5	20.4	38.1	332.1	1 130.5	616.6	1 745.2	67.7	363.6	(NA)	(NA)
1982 Census ---	221	245	89	28.8	497.5	20.6	36.2	301.9	1 025.7	514.3	1 549.1	66.8	361.7	92	90
1981 ASM -----	(NA)	(NA)	(NA)	32.6	527.8	23.9	45.5	337.6	991.1	588.4	1 587.1	72.6	348.3	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	33.2	502.3	24.8	48.9	338.1	969.5	592.2	1 541.5	60.6	344.7	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	35.1	474.8	26.8	52.3	325.0	872.2	511.5	1 366.2	46.3	312.8	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	40.0	487.1	31.4	61.5	345.0	951.5	568.7	1 492.5	49.4	308.5	(NA)	(NA)
1977 Census ---	182	201	91	39.0	450.3	30.6	57.9	315.6	859.6	529.4	1 358.7	47.7	285.9	80	92
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS															
1992 Census ---	817	885	358	50.1	1 764.8	24.0	47.3	582.9	4 182.9	2 137.7	6 360.4	158.1	1 246.4	93	89
1991 ASM -----	(NA)	(NA)	(NA)	50.4	1 654.6	23.7	47.2	537.4	3 765.7	2 078.8	5 903.5	346.8	1 133.5	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	54.7	1 730.5	26.1	52.8	600.6	3 764.7	2 169.7	5 924.0	150.6	1 219.7	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	55.0	1 672.2	28.0	56.0	625.8	3 700.3	2 060.8	5 693.1	135.8	1 225.6	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	53.7	1 552.0	26.8	52.9	554.7	3 328.2	1 918.6	5 248.9	129.9	1 176.5	(NA)	(NA)
1987 Census ---	707	784	343	53.3	1 476.3	26.7	53.3	560.0	3 204.7	1 601.2	4 788.2	129.3	1 094.1	92	92
1986 ASM -----	(NA)	(NA)	(NA)	52.2	1 350.8	26.2	51.5	530.9	2 924.4	1 575.4	4 535.4	148.0	1 082.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	55.3	1 383.4	28.3	55.3	554.5	3 046.2	1 590.0	4 609.6	149.9	1 170.1	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	57.4	1 353.0	30.3	59.7	555.0	3 017.6	1 352.3	4 307.9	131.3	1 151.7	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	55.5	1 213.3	26.9	51.6	472.6	2 611.4	1 113.3	3 781.5	101.6	1 031.8	(NA)	(NA)
1982 Census ---	586	627	290	60.3	1 256.1	30.0	57.7	482.0	2 826.9	1 175.5	4 037.8	127.4	1 074.4	91	87
1981 ASM -----	(NA)	(NA)	(NA)	53.6	1 013.4	28.1	55.7	421.0	2 437.7	1 088.4	3 508.6	117.1	934.7	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	51.2	897.4	26.6	53.1	370.2	2 049.5	986.8	2 991.6	94.2	860.0	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	51.4	828.1	27.1	54.5	353.0	1 895.8	875.6	2 682.1	83.5	775.3	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	50.6	765.6	25.5	50.8	311.0	1 609.6	764.6	2 328.5	74.1	643.6	(NA)	(NA)
1977 Census ---	382	426	207	46.5	664.8	23.4	47.0	265.9	1 399.4	657.1	2 022.0	52.1	555.9	90	80
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES															
1992 Census ---	181	193	74	16.2	533.7	11.3	21.6	331.8	1 469.2	1 117.5	2 601.5	74.1	280.4	93	87
1991 ASM -----	(NA)	(NA)	(NA)	12.8	388.2	8.3	16.3	214.0	1 260.1	986.9	2 246.8	81.8	264.6	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	10.4	278.6	6.1	12.9	138.5	976.7	683.3	1 665.9	57.0	242.3	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	10.7	269.4	6.8	12.9	134.6	987.6	672.6	1 656.9	38.2	232.3	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	10.9	267.5	7.3	14.0	145.8	976.5	659.8	1 659.0	40.4	233.9	(NA)	(NA)
1987 Census ---	148	158	61	10.1	237.1	6.5	12.7	119.9	566.5	381.2	938.6	34.9	177.4	95	76
1986 ASM -----	(NA)	(NA)	(NA)	10.4	237.3	6.2	12.7	113.8	548.3	298.1	858.6	29.0	158.8	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	10.4	236.6	6.2	11.8	117.4	554.7	310.2	865.3	41.0	171.6	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	10.9	230.9	6.5	12.2	119.5	529.5	298.2	810.9	26.3	184.5	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	9.8	189.7	6.2	11.8	103.9	422.9	259.3	692.4	18.0	154.6	(NA)	(NA)
1982 Census ---	133	145	70	11.1	198.0	6.9	13.1	109.4	460.2	266.7	728.3	27.6	172.0	94	84
1981 ASM -----	(NA)	(NA)	(NA)	15.2	256.8	10.3	20.2	153.7	530.0	368.0	901.1	32.2	182.8	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	16.5	247.9	11.3	22.2	152.7	533.6	358.6	884.0	27.8	192.4	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	17.8	245.5	11.9	23.6	143.2	556.7	315.0	844.2	28.6	203.1	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	17.0	221.6	11.8	23.4	138.4	489.4	273.9	749.9	18.0	172.0	(NA)	(NA)
1977 Census ---	100	111	62	15.9	197.6	11.2	22.5	118.0	429.0	231.3	650.4	19.9	148.8	80	80
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY															
1992 Census ---	900	964	388	68.7	2 549.0	32.3	63.4	896.8	5 721.1	3 091.2	8 873.3	324.7	1 891.4	94	93
1991 ASM -----	(NA)	(NA)	(NA)	69.3	2 496.8	34.0	73.9	921.6	5 455.6	2 800.3	8 239.7	257.2	1 922.4	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	78.4	2 603.9	38.7	77.3	995.3	5 352.4	3 041.0	8 389.7	292.7	1 996.8	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	78.4	2 485.5	39.6	78.7	962.9	5 206.1	2 798.9	7 919.9	304.7	1 935.0	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	82.9	2 511.1	42.1	84.7	990.6	5 198.0	2 801.4	7 984.4	214.8	1 918.5	(NA)	(NA)
1987 Census ---	864	930	412	85.2	2 476.7	43.9	91.4	1 005.4	5 090.9	2 662.4	7 703.3	307.5	1 878.7	95	92
1986 ASM -----	(NA)	(NA)	(NA)	86.2	2 356.1	44.3	89.2	986.0	4 535.2	2 407.1	6 940.5	290.4	1 739.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	92.4	2 293.6	48.3	93.1	989.6	5 169.8	2 474.0	7 705.2	343.1	1 811.8	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	95.8	2 356.1	53.0	101.7	987.2	5 371.3	2 589.5	7 810.5	418.0	1 890.7	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	89.7	2 052.3	49.5	94.1	860.4	4 413.3	2 129.0	6 484.4	272.6	1 586.5	(NA)	(NA)
1982 Census ---	676	749	352	89.7	1 888.2	48.9	92.5	757.1	4 290.1	1 840.7	6 094.4	308.3	1 469.1	94	91
1981 ASM -----	(NA)	(NA)	(NA)	94.8	1 852.9	50.2	96.7	736.4	4 074.6	1 780.9	5 744.9	278.6	1 344.7	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	94.9	1 647.9	52.4	100.7	667.4	3 574.1	1 697.9	5 183.4	260.4	1 229.9	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	84.6	1 258.9	48.4	96.5	557.1	2 796.0	1 340.4	4 025.0	215.7	1 049.3	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	76.6	1 072.3	45.6	88.6	503.6	2 162.1	1 286.2	3 368.6	150.0	834.4	(NA)	(NA)

See footnotes at end of table.

Table 1a. Historical Statistics for the Industry: 1992 and Earlier Years—Con.

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year ¹	All establishments ³			All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Cost of materials ⁵ (million dollars)	Value of shipments (million dollars)	New capital expenditures ⁶ (million dollars)	End-of-year inventories ⁴ (million dollars)	Ratios	
	Companies ² (no.)	Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Specialization ⁷ (percent)	Coverage ⁸ (percent)
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY—Con.															
1977 Census ---	621	671	279	66.5	889.1	40.4	78.3	414.5	1 807.7	1 026.8	2 761.0	99.1	668.9	90	89
INDUSTRY 3826, ANALYTICAL INSTRUMENTS															
1992 Census ---	551	593	227	39.7	1 478.1	15.2	29.6	394.3	3 004.8	2 205.5	5 191.3	227.8	992.4	90	83
1991 ASM -----	(NA)	(NA)	(NA)	37.0	1 343.5	14.7	29.8	366.5	3 134.0	1 965.0	5 070.6	195.3	980.2	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	37.8	1 285.3	15.1	30.6	360.9	3 018.7	1 875.6	4 906.1	151.9	1 004.0	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	35.9	1 142.5	15.3	30.8	354.4	2 776.4	1 598.1	4 306.1	163.4	971.9	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	32.2	1 012.6	13.6	27.6	318.3	2 458.9	1 447.9	3 863.0	167.0	852.5	(NA)	(NA)
1987 Census ---	528	562	207	31.2	892.9	13.5	26.7	287.3	2 107.1	1 363.2	3 468.2	125.5	781.2	87	90
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES															
1992 Census ---	415	425	167	18.9	679.9	9.4	19.8	256.7	1 435.0	836.0	2 262.9	65.0	513.7	89	83
1991 ASM -----	(NA)	(NA)	(NA)	22.4	829.6	11.1	23.0	301.3	1 342.0	879.7	2 380.4	77.6	568.9	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	22.0	702.5	12.6	26.2	333.1	1 326.7	874.2	2 217.7	77.2	678.4	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	21.1	627.4	11.9	23.3	287.6	1 186.3	749.2	1 917.5	72.4	646.6	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	21.3	630.1	11.7	22.9	275.7	1 251.7	786.8	2 001.4	83.3	650.6	(NA)	(NA)
1987 Census ---	236	250	127	20.1	581.6	11.3	21.9	260.8	1 167.8	694.7	1 863.6	83.3	610.2	91	80
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.															
1992 Census ---	977	1 006	318	38.1	1 305.4	19.3	38.1	483.6	2 809.5	1 584.2	4 400.1	180.1	1 076.7	91	82
1991 ASM -----	(NA)	(NA)	(NA)	38.7	1 256.7	19.5	40.1	479.2	2 741.0	1 620.0	4 395.3	131.5	1 076.1	(NA)	(NA)
1990 ASM -----	(NA)	(NA)	(NA)	36.3	1 155.4	18.1	36.2	429.3	2 518.7	1 443.1	4 039.7	126.8	1 040.3	(NA)	(NA)
1989 ASM -----	(NA)	(NA)	(NA)	38.4	1 117.8	20.4	41.5	447.2	2 404.2	1 394.7	3 828.8	147.2	1 018.7	(NA)	(NA)
1988 ASM -----	(NA)	(NA)	(NA)	38.8	1 102.3	20.7	40.8	432.1	2 368.5	1 349.1	3 698.6	116.8	980.3	(NA)	(NA)
1987 Census ---	938	970	304	41.0	1 098.8	20.2	39.8	413.9	2 259.0	1 228.1	3 442.0	104.0	928.0	86	80

¹In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1977, see 1977 Census of Manufactures, vol. II, table 1 of the industry chapter.

²For the Census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

³Includes establishments with payroll at any time during the year.

⁴Beginning in 1982, all respondents were requested to report their inventories at cost or market prior to adjustment to LIFO cost. This is a change from prior years when respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, 1982 data for inventories and value added by manufacture are not comparable to prior-year data.

⁵Cost of materials is the sum of five components: the cost of (1) parts used in the manufacture of finished goods (materials, parts, containers, and supplies incorporated into products or otherwise directly consumed in the process); (2) purchased items later resold without further manufacture; (3) fuels; (4) electricity; and (5) commissions or fees to outside parties for contract manufacturing. A separate cost for each of the five components is shown in table 3a. Detailed data on materials consumed by type, are shown in table 7.

⁶Detailed data on new machinery and equipment expenditures are provided in table 3c.

⁷Represents ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for establishments classified in the industry.

⁸Represents ratio of primary products shipped by establishments classified in industry to total shipments of such products by all manufacturing establishments, wherever classified.

Table 1b. Selected Operating Ratios for the Industry: 1992 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT									
1992 Census -----	43 358	41	1 960	17.29	29	60	95 730	45	120.19
1991 ASM -----	41 568	40	1 941	16.67	31	64	84 604	49	108.59
1990 ASM -----	39 088	42	1 970	15.90	31	64	79 502	49	97.12
1989 ASM -----	36 558	41	1 965	14.99	31	66	70 470	52	86.46
1988 ASM -----	34 728	43	1 913	14.99	31	66	68 272	51	83.02
1987 Census -----	33 481	43	1 980	14.21	34	68	66 970	50	78.69
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE									
1992 Census -----	32 294	51	2 044	11.63	39	66	74 288	43	71.46
1991 ASM -----	32 818	47	2 116	11.41	36	64	74 331	44	75.35
1990 ASM -----	29 742	51	2 099	10.80	36	63	67 961	44	63.34
1989 ASM -----	28 516	54	2 071	10.57	37	63	68 060	42	61.02
1988 ASM -----	27 539	58	2 071	10.14	38	63	67 456	41	56.12
1987 Census -----	25 784	56	2 000	10.17	36	61	66 807	39	59.50
INDUSTRY 3822, ENVIRONMENTAL CONTROLS									
1992 Census -----	27 416	67	1 911	11.09	38	65	65 320	42	50.87
1991 ASM -----	27 342	66	1 859	11.29	40	67	57 676	47	46.85
1990 ASM -----	25 471	70	1 934	10.42	39	67	56 000	45	41.52
1989 ASM -----	24 161	72	1 945	10.21	38	64	57 933	42	41.57
1988 ASM -----	23 756	72	1 949	10.09	38	66	53 295	45	38.01
1987 Census -----	22 732	70	1 946	9.87	37	66	49 158	46	35.99
1986 ASM -----	22 310	72	1 930	9.81	35	63	49 543	45	35.80
1985 ASM -----	21 435	72	1 892	9.64	34	63	48 642	44	35.72
1984 ASM -----	20 362	74	1 842	9.32	35	64	46 227	44	33.86
1983 ASM -----	19 337	73	1 868	8.72	35	66	40 520	48	29.67
1982 Census -----	17 274	72	1 757	8.34	33	65	35 615	49	28.33
1981 ASM -----	16 190	73	1 904	7.42	37	70	30 402	53	21.78
1980 ASM -----	15 130	75	1 972	6.91	38	71	29 202	52	19.83

38A-10 SEARCH & NAV. EQUIP.; MEASUR., CNTRL., OPT. INSTR.

MANUFACTURES—INDUSTRY SERIES

Table 1b. Selected Operating Ratios for the Industry: 1992 and Earlier Years—Con.

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
INDUSTRY 3822, ENVIRONMENTAL CONTROLS—Con.									
1979 ASM -----	13 527	76	1 951	6.21	37	72	24 849	54	16.68
1978 ASM -----	12 178	79	1 959	5.61	38	71	23 788	51	15.47
1977 Census -----	11 546	78	1 892	5.45	39	72	22 041	52	14.85
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS									
1992 Census -----	35 226	48	1 971	12.32	34	61	83 491	42	88.43
1991 ASM -----	32 829	47	1 992	11.39	35	63	74 716	44	79.78
1990 ASM -----	31 636	48	2 023	11.38	37	66	68 824	46	71.30
1989 ASM -----	30 404	51	2 000	11.18	36	66	67 278	45	66.08
1988 ASM -----	28 901	50	1 974	10.49	37	66	61 978	47	62.91
1987 Census -----	27 698	50	1 996	10.51	33	64	60 126	46	60.13
1986 ASM -----	25 877	50	1 966	10.31	35	65	56 023	46	56.78
1985 ASM -----	25 016	51	1 954	10.03	34	65	55 085	45	55.08
1984 ASM -----	23 571	53	1 970	9.30	31	63	52 571	45	50.55
1983 ASM -----	21 861	48	1 918	9.16	29	62	47 052	46	50.61
1982 Census -----	20 831	50	1 923	8.35	29	60	46 881	44	48.99
1981 ASM -----	18 907	52	1 982	7.56	31	60	45 479	42	43.76
1980 ASM -----	17 527	52	1 996	6.97	33	63	40 029	44	38.60
1979 ASM -----	16 111	53	2 011	6.48	33	64	36 883	44	34.79
1978 ASM -----	15 130	50	1 992	6.12	33	66	31 810	48	31.69
1977 Census -----	14 297	50	2 009	5.66	32	65	30 095	48	29.77
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES									
1992 Census -----	32 944	70	1 912	15.36	43	63	90 691	36	68.02
1991 ASM -----	30 328	65	1 964	13.13	44	61	98 445	31	77.31
1990 ASM -----	26 788	63	1 955	10.74	41	58	93 913	29	75.71
1989 ASM -----	25 178	64	1 897	10.43	41	57	92 299	27	76.56
1988 ASM -----	24 541	67	1 918	10.41	40	56	89 587	27	69.75
1987 Census -----	23 475	64	1 954	9.44	41	66	56 089	42	44.61
1986 ASM -----	22 817	60	2 048	8.96	35	62	52 721	43	43.17
1985 ASM -----	22 750	60	1 903	9.95	36	63	53 337	43	47.01
1984 ASM -----	21 183	60	1 877	9.80	37	65	48 578	44	43.40
1983 ASM -----	19 357	63	1 903	8.81	37	65	43 153	45	35.84
1982 Census -----	17 838	62	1 899	8.35	37	64	41 459	43	35.13
1981 ASM -----	16 895	68	1 961	7.61	41	69	34 868	48	26.24
1980 ASM -----	15 024	68	1 965	6.88	41	69	32 339	46	24.04
1979 ASM -----	13 792	67	1 983	6.07	37	66	31 275	44	23.59
1978 ASM -----	13 035	69	1 983	5.91	37	66	28 788	45	20.91
1977 Census -----	12 428	70	2 009	5.24	36	66	26 981	46	19.07
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY									
1992 Census -----	37 103	47	1 963	14.15	35	64	83 277	45	90.24
1991 ASM -----	36 029	49	2 174	12.47	34	64	78 724	46	73.82
1990 ASM -----	33 213	49	1 997	12.88	36	67	68 270	49	69.24
1989 ASM -----	31 703	51	1 987	12.24	35	67	66 404	48	66.15
1988 ASM -----	30 291	51	2 012	11.70	35	67	62 702	48	61.37
1987 Census -----	29 069	52	2 082	11.00	35	67	59 752	49	55.70
1986 ASM -----	27 333	51	2 014	11.05	35	69	52 613	52	50.84
1985 ASM -----	24 823	52	1 928	10.63	32	62	55 950	44	55.53
1984 ASM -----	24 594	55	1 919	9.71	33	63	56 068	44	52.82
1983 ASM -----	22 880	55	1 901	9.14	33	64	49 201	47	46.90
1982 Census -----	21 050	55	1 892	8.18	30	61	47 827	44	46.38
1981 ASM -----	19 545	53	1 926	7.62	31	63	42 981	45	42.14
1980 ASM -----	17 365	55	1 922	6.63	33	65	37 662	46	35.49
1979 ASM -----	14 881	57	1 994	5.77	33	65	33 050	45	28.97
1978 ASM -----	13 999	60	1 943	5.68	38	70	28 226	50	24.40
1977 Census -----	13 370	61	1 938	5.29	37	69	27 183	49	23.09
INDUSTRY 3826, ANALYTICAL INSTRUMENTS									
1992 Census -----	37 232	38	1 947	13.32	42	71	75 688	49	101.51
1991 ASM -----	36 311	40	2 027	12.30	39	65	84 703	43	105.17
1990 ASM -----	34 003	40	2 026	11.79	38	64	79 860	43	98.65
1989 ASM -----	31 825	43	2 013	11.51	37	64	77 337	41	90.14
1988 ASM -----	31 447	42	2 029	11.53	37	64	76 363	41	89.09
1987 Census -----	28 619	43	1 978	10.76	39	65	67 535	42	78.92
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES									
1992 Census -----	35 974	50	2 106	12.96	37	67	75 926	47	72.47
1991 ASM -----	37 036	50	2 072	13.10	37	72	59 911	62	58.35
1990 ASM -----	31 932	57	2 079	12.71	39	71	60 305	53	50.64
1989 ASM -----	29 735	56	1 958	12.34	39	72	56 223	53	50.91
1988 ASM -----	29 582	55	1 957	12.04	39	71	58 765	50	54.66
1987 Census -----	28 935	56	1 938	11.91	37	68	58 100	50	53.32
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.									
1992 Census -----	34 262	51	1 974	12.69	36	66	73 740	46	73.74
1991 ASM -----	32 473	50	2 056	11.95	37	65	70 827	46	68.35
1990 ASM -----	31 829	50	2 000	11.86	36	64	69 386	46	69.58
1989 ASM -----	29 109	53	2 034	10.78	36	66	62 609	46	57.93
1988 ASM -----	28 410	53	1 971	10.59	36	66	61 044	47	58.05
1987 Census -----	26 800	49	1 970	10.40	36	68	55 098	49	56.76

Note: For qualifications of data, see footnotes on table 1a.

Table 2. Industry Statistics for Selected States: 1992 and 1987

[Excludes data for auxiliaries. States with 100 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1992											1987		
	E1	All establishments		All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ² (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number ² (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT														
United States -----	-	769	409	255.0	11 056.2	103.6	203.1	3 511.8	24 411.1	10 115.8	35 266.1	859.1	369.4	24 738.7
Alabama -----	E3	8	4	.9	23.6	.6	1.3	12.0	48.0	76.2	122.2	2.1	1.2	77.5
Arizona -----	-	12	8	9.0	365.8	3.0	5.9	82.9	1 026.7	484.4	1 545.6	49.7	10.4	556.1
Arkansas -----	-	3	3	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
California -----	-	164	103	65.4	3 193.9	24.2	51.9	951.0	6 593.4	2 353.2	9 079.2	172.9	99.5	6 730.7
Colorado -----	-	13	7	H	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Connecticut -----	-	23	11	4.0	174.4	1.7	3.3	45.3	258.1	126.8	370.9	9.5	7.1	331.7
Florida -----	-	55	21	18.7	727.4	6.4	12.0	146.2	1 831.0	758.3	2 667.3	84.9	25.0	1 984.6
Georgia -----	E5	12	4	.6	24.0	.2	.3	4.5	34.1	18.3	53.9	(D)	F	(D)
Illinois -----	-	15	10	4.2	178.4	1.0	2.2	29.2	334.5	145.0	494.5	(D)	7.6	491.9
Indiana -----	-	4	3	.2	7.6	.1	.2	2.2	13.7	4.1	16.9	(D)	(NA)	(D)
Iowa -----	-	4	3	I	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Kansas -----	E1	15	9	H	(D)	(D)	(D)	(D)	(D)	(D)	(D)	5.3	(NA)	(D)
Louisiana -----	E9	5	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Maryland -----	-	19	10	17.7	803.4	6.2	8.8	229.0	1 796.1	703.7	2 572.4	60.9	24.6	1 574.8
Massachusetts -----	-	49	27	16.3	668.5	10.5	19.3	363.0	1 617.5	928.3	2 490.8	40.3	22.2	1 528.1
Michigan -----	-	13	9	2.9	109.0	1.6	4.6	69.3	193.7	62.3	262.8	7.5	4.1	184.9
Minnesota -----	-	7	4	H	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Mississippi -----	-	3	2	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri -----	-	7	5	4.9	174.9	1.3	2.4	36.1	211.4	171.1	392.1	(D)	(NA)	(D)
New Hampshire -----	-	10	8	I	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
New Jersey -----	-	46	20	15.1	744.9	7.4	14.6	319.4	1 319.5	857.6	2 281.2	52.8	21.1	1 498.8
New Mexico -----	-	5	3	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
New York -----	-	72	38	22.3	1 035.5	8.0	14.9	317.7	2 806.5	967.7	3 873.1	93.3	39.7	2 791.4
North Carolina -----	-	8	4	1.1	32.5	.8	1.5	17.7	61.8	82.8	140.2	(D)	G	(D)
Ohio -----	E1	20	5	1.1	38.9	.7	1.5	21.1	91.2	31.9	122.9	2.2	.8	38.1
Oklahoma -----	-	4	2	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Oregon -----	E1	15	8	1.7	53.8	.8	1.5	16.9	145.1	58.9	202.9	(D)	F	(D)
Pennsylvania -----	E1	24	11	2.7	92.4	1.4	2.7	37.6	216.0	141.6	353.8	11.3	5.4	281.5
Rhode Island -----	-	5	2	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Texas -----	-	50	27	23.0	925.8	8.5	17.7	253.3	2 001.5	717.9	2 864.5	83.8	33.1	2 000.1
Utah -----	-	6	5	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	5.6	(NA)	(D)
Virginia -----	-	13	11	8.8	352.5	2.6	5.4	66.3	1 031.7	304.8	1 371.7	54.5	10.4	1 099.8
Washington -----	E5	27	13	3.5	148.1	1.1	2.6	32.2	316.2	68.2	373.2	11.6	.3	34.6
Wisconsin -----	-	8	4	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE														
United States -----	-	342	143	17.7	571.6	9.0	18.4	213.9	1 314.9	817.1	2 106.0	55.4	17.1	1 142.4
Arkansas -----	-	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
California -----	E1	64	30	2.6	89.7	1.3	2.4	29.0	223.7	102.9	328.2	19.3	G	(D)
Colorado -----	-	5	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Connecticut -----	-	7	4	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	58.4
Delaware -----	-	5	2	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Florida -----	E1	13	6	.3	7.3	.1	.3	2.6	17.8	7.7	25.6	(D)	(NA)	(NA)
Illinois -----	-	18	10	1.2	38.7	.6	1.4	16.9	77.3	59.2	136.2	2.0	G	(D)
Indiana -----	E3	9	1	.1	3.0	.1	.1	1.1	6.4	3.4	9.8	.2	(NA)	(NA)
Iowa -----	-	3	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Maine -----	-	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Maryland -----	E1	9	5	.2	6.5	.1	.2	2.2	15.1	6.8	21.7	.3	(NA)	(NA)
Massachusetts -----	-	25	9	.7	22.6	.3	.6	8.3	61.6	32.0	93.0	1.5	F	(D)
Michigan -----	-	13	5	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.6	F	42.6
Minnesota -----	-	7	3	.5	17.4	.2	.5	6.2	40.8	16.4	57.5	1.6	F	(D)
Mississippi -----	E7	4	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri -----	-	5	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Nevada -----	-	2	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
New Hampshire -----	-	5	2	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
New Jersey -----	E1	23	12	1.5	46.3	.7	1.5	20.0	86.2	54.5	141.9	1.6	1.7	85.9
New York -----	-	24	7	1.0	33.5	.5	1.1	10.5	85.1	48.7	133.6	3.0	F	(D)
North Carolina -----	-	7	1	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Ohio -----	-	14	5	.8	28.4	.4	.9	12.9	56.5	36.8	93.1	(D)	F	(D)
Oregon -----	E1	6	1	.1	2.8	.1	.2	1.8	4.6	4.2	8.7	(Z)	(NA)	(D)
Pennsylvania -----	-	28	16	1.6	49.4	.9	1.8	23.9	85.4	62.7	149.0	3.3	1.2	68.7
Texas -----	E1	12	7	.5	13.4	.3	.7	6.7	30.4	21.3	52.1	1.0	E	(D)
Wisconsin -----	-	9	5	1.4	41.3	.9	2.0	23.2	89.2	60.9	150.4	4.7	1.4	57.3

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1992 and 1987—Con.

[Excludes data for auxiliaries. States with 100 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1992											1987		
	All establishments		All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ² (1,000)	Value added by manufacture (million dollars)	
	E ¹	Total (no.)	With 20 employees or more (no.)	Number ² (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)							Wages (million dollars)
INDUSTRY 3822, ENVIRONMENTAL CONTROLS														
United States	—	318	130	25.0	685.4	16.8	32.1	356.0	1 633.0	997.1	2 607.1	81.3	26.5	1 302.7
Alabama	—	3	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
California	—	42	13	1.7	49.5	1.2	2.3	26.5	132.0	85.3	214.1	(D)	3.7	141.4
Connecticut	—	8	2	.2	5.5	.1	.2	2.7	13.4	4.2	17.2	(D)	.3	(D)
Florida	E3	19	5	.5	12.1	.4	.7	6.2	33.3	22.0	53.6	1.8	.4	17.3
Georgia	E1	7	2	.3	5.5	.2	.4	3.5	17.3	7.3	26.0	.1	F	(D)
Illinois	—	18	12	4.1	119.5	2.4	4.6	61.5	274.2	223.8	492.8	19.2	3.9	230.2
Indiana	—	9	6	1.8	44.8	1.4	2.5	27.7	116.1	78.2	193.4	5.5	1.9	83.5
Iowa	—	3	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Kentucky	—	4	4	1.3	27.6	1.0	1.9	15.0	72.2	38.5	111.0	2.3	E	(D)
Maine	E4	4	3	.2	4.1	.1	.2	1.6	5.5	8.9	15.2	.2	(NA)	(D)
Massachusetts	E1	12	4	.7	19.1	.4	.7	6.9	39.8	21.3	60.4	1.0	E	(D)
Michigan	—	18	4	.6	14.0	.5	.7	7.0	48.0	35.8	83.7	(D)	E	(D)
Minnesota	—	13	5	H	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Missouri	—	5	3	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
New Hampshire	—	4	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey	E4	9	3	.2	7.0	.1	.2	3.0	15.6	8.1	22.6	.5	.2	6.2
New Mexico	—	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
New York	—	17	6	.5	12.9	.3	.6	5.8	26.7	18.8	44.5	(D)	(NA)	(D)
North Carolina	—	8	4	.2	5.5	.1	.2	2.0	10.8	4.3	14.6	.3	(NA)	(NA)
Ohio	—	21	9	2.6	56.1	2.0	3.9	33.9	121.9	47.1	170.6	5.8	3.8	137.2
Oklahoma	E9	5	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Pennsylvania	—	18	6	.8	22.7	.5	1.0	11.3	26.9	29.2	57.0	5.2	1.0	11.0
Rhode Island	E1	5	4	.7	17.4	.4	.8	6.0	38.0	11.5	49.6	.8	F	(D)
Tennessee	—	8	4	1.2	28.3	1.0	1.9	21.4	61.5	39.2	100.2	(D)	G	(D)
Texas	E2	13	7	.7	18.4	.5	1.2	11.3	59.4	32.2	91.3	1.6	(NA)	(D)
Virginia	—	3	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Wisconsin	—	14	6	.7	17.6	.5	.9	9.5	31.7	22.7	54.6	(D)	.6	27.4
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS														
United States	E1	885	358	50.1	1 764.8	24.0	47.3	582.9	4 182.9	2 137.7	6 360.4	158.1	53.3	3 204.7
Arizona	—	14	3	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	G	(D)
California	E2	173	71	7.7	286.7	3.7	7.2	91.5	576.2	353.1	946.6	27.0	7.6	479.6
Colorado	—	24	11	1.1	39.7	.6	1.1	13.1	129.2	39.5	168.1	7.2	.6	57.4
Connecticut	—	29	16	2.7	90.8	1.6	3.0	39.1	215.0	117.3	333.7	5.7	2.9	175.6
Florida	E2	23	8	.4	12.7	.2	.3	4.0	31.7	15.8	48.2	(D)	.7	31.6
Georgia	E1	12	1	.2	6.0	.1	.2	2.2	18.7	11.2	30.0	(D)	(NA)	(NA)
Illinois	E1	49	23	2.5	81.4	1.1	2.2	22.9	203.3	104.7	311.2	11.0	3.9	169.1
Indiana	—	18	11	1.0	26.2	.6	1.1	11.8	65.3	33.1	98.1	1.9	.8	38.4
Kansas	—	2	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Kentucky	—	1	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Louisiana	E6	15	6	.9	28.8	.7	1.3	19.5	47.5	26.3	70.2	.9	.3	10.4
Massachusetts	E2	54	32	4.1	133.3	2.3	4.5	53.9	334.0	153.4	484.7	7.8	4.5	373.6
Michigan	E2	38	13	1.0	34.5	.5	1.0	11.9	68.3	38.6	106.4	2.2	1.1	63.5
Minnesota	E1	20	11	3.2	106.3	1.4	3.0	33.4	148.8	131.0	284.6	(D)	(NA)	(D)
Missouri	E1	11	2	.2	3.4	.1	.2	1.6	10.3	6.0	16.5	(D)	(NA)	(NA)
Nebraska	—	4	4	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Nevada	—	4	2	.1	3.7	.1	.1	1.2	11.9	4.9	17.0	(D)	(NA)	(NA)
New Jersey	E1	39	11	.8	24.5	.4	.7	8.1	53.3	31.4	84.6	1.4	1.0	51.6
New York	—	38	20	2.3	78.2	1.0	2.2	22.8	167.6	104.3	272.4	15.2	(NA)	(D)
North Carolina	E3	17	5	.3	8.8	.1	.3	2.8	20.6	11.3	31.6	.5	E	(D)
Ohio	—	41	21	4.7	194.5	1.9	3.5	55.2	392.6	228.2	626.6	15.2	3.2	210.8
Oklahoma	—	11	5	1.2	38.9	.6	1.1	18.5	90.2	68.8	159.8	2.5	F	(D)
Oregon	E2	13	1	.2	5.1	.1	.1	1.5	10.0	7.2	17.3	.2	(NA)	(NA)
Pennsylvania	E1	66	29	6.8	252.8	3.2	6.3	82.4	608.8	307.6	941.4	16.6	8.5	497.8
Rhode Island	E1	6	2	.2	5.5	.1	.2	1.4	14.8	3.3	18.1	(D)	(NA)	(NA)
Tennessee	E1	8	3	.5	7.2	.4	.7	4.8	8.6	3.5	10.7	(D)	G	(D)
Texas	E2	64	25	2.9	102.6	1.2	2.4	29.6	211.7	136.5	343.1	8.0	3.7	200.3
Virginia	—	11	2	.2	7.6	.1	.2	4.9	17.9	13.8	31.9	.5	E	(D)
Washington	—	13	4	.3	8.9	.1	.3	3.2	19.3	14.2	33.7	.6	.2	9.8
West Virginia	—	3	2	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Wisconsin	—	21	6	.9	25.0	.5	1.1	13.7	57.6	31.0	88.9	1.5	E	(D)
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES														
United States	—	193	74	16.2	533.7	11.3	21.6	331.8	1 469.2	1 117.5	2 601.5	74.1	10.1	566.5
Alabama	—	2	2	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Arkansas	—	2	2	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California	E1	23	7	.7	20.9	.4	.8	12.2	33.4	48.0	95.6	(D)	F	(D)
Colorado	—	2	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Connecticut	—	9	4	.3	6.7	.2	.4	3.4	10.5	7.0	17.7	.2	.9	27.2
Florida	E3	7	2	.1	2.2	.1	.2	1.0	6.9	7.0	13.8	.2	(NA)	(NA)
Georgia	—	1	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Illinois	—	12	7	.9	22.7	.5	1.0	9.4	64.1	35.4	100.2	3.0	E	(D)
Kentucky	—	2	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Michigan	—	10	6	I	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1992 and 1987—Con.

[Excludes data for auxiliaries. States with 100 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1992											1987		
	E1	All establishments		All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees ² (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number ² (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES—Con.														
Nebraska.....	—	2	1	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
New Hampshire.....	—	3	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
New Jersey.....	E6	10	3	.3	7.0	.1	.3	1.3	18.3	13.8	32.1	.3	(NA)	(NA)
New York.....	E1	11	2	.1	2.9	.1	.2	1.8	6.3	2.8	9.1	(D)	(NA)	(NA)
North Carolina.....	—	7	2	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Ohio.....	—	9	3	.4	10.8	.3	.8	6.9	27.2	49.0	75.7	(D)	(NA)	(D)
Oregon.....	—	7	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	(NA)	(NA)
Pennsylvania.....	—	11	7	2.1	67.5	1.4	2.5	37.0	216.4	112.8	328.3	13.2	2.2	160.9
South Carolina.....	E7	4	3	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Tennessee.....	—	2	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas.....	—	17	6	.5	16.0	.3	.6	8.4	39.8	18.3	60.0	1.0	.3	22.0
Virginia.....	—	1	1	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Wisconsin.....	—	7	2	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY														
United States.....	E1	964	388	68.7	2 549.0	32.3	63.4	896.8	5 721.1	3 091.2	8 873.3	324.7	85.2	5 090.9
Alabama.....	—	7	3	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	38.4
Arizona.....	E1	18	4	.3	9.3	.1	.2	2.5	16.6	11.6	28.5	.5	.3	13.8
California.....	E1	268	110	17.6	761.5	8.5	17.0	289.3	1 653.8	778.2	2 438.0	87.6	19.6	1 375.4
Colorado.....	—	34	9	4.2	181.1	2.1	4.8	65.7	360.9	219.2	577.2	(D)	(NA)	(D)
Connecticut.....	E4	26	13	.7	21.8	.3	.7	7.0	49.3	24.3	74.7	1.2	1.0	46.8
Florida.....	—	28	12	1.8	58.3	.7	1.4	16.4	138.8	82.5	194.5	7.5	1.4	57.1
Georgia.....	—	11	5	.7	26.8	.3	.6	5.3	74.3	60.4	134.2	2.1	F	(D)
Illinois.....	E1	41	20	2.9	90.4	1.4	2.6	30.0	402.2	266.4	659.5	64.2	2.3	152.5
Indiana.....	—	13	5	1.3	35.6	.9	1.7	21.1	66.9	40.8	111.0	3.2	G	(D)
Kansas.....	—	5	2	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	F	(D)
Maryland.....	E1	14	5	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.7	50.3
Massachusetts.....	E2	55	20	5.2	195.9	2.0	3.6	63.5	498.9	150.2	651.5	26.0	6.8	549.2
Michigan.....	E3	30	10	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.9	57.0
Minnesota.....	—	21	6	.7	24.7	.2	.4	5.4	58.4	25.5	83.4	1.2	F	(D)
Mississippi.....	—	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Missouri.....	—	10	3	.3	9.9	.1	.3	3.3	15.6	8.6	25.5	.7	E	(D)
Nevada.....	—	4	4	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.2	26.4
New Hampshire.....	—	19	9	2.3	65.6	1.6	3.1	42.7	99.5	79.1	192.7	5.3	3.5	208.4
New Jersey.....	E3	36	14	2.0	84.9	.7	1.6	24.1	189.9	73.9	258.8	6.6	4.1	242.9
New York.....	—	56	28	4.6	179.4	2.3	4.5	66.0	306.9	199.7	579.6	14.6	7.5	290.6
North Carolina.....	—	8	6	1.2	40.4	.8	1.4	20.1	73.4	45.7	121.3	2.7	G	(D)
Ohio.....	—	35	17	2.0	63.5	.9	1.9	19.2	113.9	81.0	201.2	4.7	2.6	124.0
Oregon.....	—	27	9	I	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Pennsylvania.....	E1	34	15	1.4	37.1	.8	1.4	15.8	101.7	60.0	162.3	2.3	1.5	103.1
Rhode Island.....	—	7	2	.2	6.1	.1	.2	2.2	12.3	4.5	17.2	.2	.5	26.1
South Carolina.....	—	3	1	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	G	(D)
South Dakota.....	—	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	E	(D)
Texas.....	E1	50	18	1.5	49.2	.6	1.2	11.1	102.0	63.7	167.5	2.9	G	(D)
Utah.....	E3	4	3	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Virginia.....	—	11	5	.4	14.8	.2	.5	7.0	31.3	8.9	39.0	.6	G	(D)
Washington.....	—	35	12	4.2	155.3	1.8	2.5	47.1	420.7	186.1	607.9	21.7	6.2	478.8
Wisconsin.....	E9	11	5	.9	24.7	.5	1.0	10.7	50.1	36.1	86.5	2.8	F	(D)
INDUSTRY 3826, ANALYTICAL INSTRUMENTS														
United States.....	—	593	227	39.7	1 478.1	15.2	29.6	394.3	3 004.8	2 205.5	5 191.3	227.8	31.2	2 107.1
Arizona.....	E1	11	3	.3	9.3	.1	.1	1.4	20.4	9.7	30.6	.8	.2	13.0
California.....	—	133	56	10.2	406.2	3.2	5.9	97.7	868.9	630.8	1 488.3	44.9	6.5	523.9
Colorado.....	—	16	7	1.1	37.0	.5	.9	10.6	51.8	39.5	89.1	5.9	.8	48.6
Connecticut.....	—	12	5	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	G	(D)
Delaware.....	—	4	3	G	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Florida.....	—	19	7	4.1	167.3	2.0	3.9	56.9	175.5	243.8	424.7	(D)	2.5	156.6
Georgia.....	—	5	3	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Illinois.....	E7	19	5	.4	13.9	.2	.4	4.8	35.4	27.8	61.9	1.0	E	(D)
Indiana.....	—	5	2	.2	5.3	(Z)	.1	.7	12.2	4.5	16.4	(D)	(NA)	(NA)
Louisiana.....	E1	3	2	.1	2.7	(Z)	.1	.6	4.9	2.4	7.4	.2	(NA)	(NA)
Maryland.....	E5	18	4	.2	8.3	.1	.2	2.5	25.8	11.7	35.0	1.1	.8	44.8
Massachusetts.....	—	62	30	5.6	221.2	1.8	3.6	45.8	578.6	315.6	894.9	15.4	5.9	314.2
Michigan.....	—	16	5	1.1	31.0	.6	1.3	12.5	60.1	54.1	114.7	2.6	F	(D)
Minnesota.....	—	10	4	.5	21.4	.2	.4	6.5	43.9	24.7	69.1	(D)	F	(D)
Nebraska.....	—	5	3	.4	10.7	.2	.4	5.2	22.6	6.9	29.2	(D)	E	(D)
New Hampshire.....	E1	7	5	.3	10.7	.1	.2	2.1	30.2	19.9	46.1	.7	(NA)	(NA)
New Jersey.....	—	28	12	1.2	46.8	.5	.9	13.8	96.3	80.6	176.3	3.5	1.1	72.7
New York.....	—	27	8	1.0	32.6	.3	.7	9.4	66.9	51.0	120.0	4.1	G	(D)
North Carolina.....	E1	6	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Ohio.....	E1	24	9	1.4	42.8	.6	1.1	10.5	78.4	60.3	139.8	3.9	1.0	49.0

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1992 and 1987—Con.

[Excludes data for auxiliaries. States with 100 employees or more are shown. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1992											1987		
	E1	All establishments		All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employ-ees ² (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number ² (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
INDUSTRY 3826, ANALYTICAL INSTRUMENTS—Con.														
Oregon	E4	11	5	.4	13.0	.1	.3	3.6	29.2	22.2	51.6	1.0	.4	12.9
Pennsylvania	E1	36	16	2.4	83.4	1.2	1.8	29.2	144.8	109.6	253.5	7.6	2.0	160.2
Rhode Island	—	4	2	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Tennessee	E9	5	1	E	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas	E1	40	15	3.5	116.7	1.4	2.8	25.3	130.0	135.5	258.1	(D)	(NA)	(D)
Vermont	—	2	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Virginia	—	9	3	.3	13.0	.1	.2	2.1	25.8	13.7	39.9	1.2	E	(D)
Wisconsin	—	12	5	1.2	50.3	.4	.9	9.7	101.4	59.5	161.0	4.4	G	(D)
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES														
United States	—	425	167	18.9	679.9	9.4	19.8	256.7	1 435.0	836.0	2 262.9	65.0	20.1	1 167.8
Arizona	E3	9	1	.1	4.3	(Z)	.1	.9	7.1	4.2	11.2	(D)	(NA)	(NA)
Arkansas	—	2	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
California	—	103	45	6.5	257.8	2.8	6.0	77.8	556.7	368.3	933.3	20.4	6.4	438.3
Colorado	—	16	5	.4	9.7	.3	.6	5.2	21.5	13.5	34.6	1.0	E	(D)
Connecticut	—	9	5	1.7	86.3	.7	1.2	25.9	169.9	50.4	212.5	(D)	1.9	157.6
Florida	—	20	8	.8	20.9	.5	.9	9.7	62.5	27.3	86.7	5.4	E	20.3
Illinois	E3	17	4	.2	5.4	.1	.2	2.6	10.7	4.0	15.3	.3	E	(D)
Maryland	—	7	3	.5	14.2	.3	.6	7.9	24.3	10.0	34.0	(D)	E	(D)
Massachusetts	—	39	18	2.3	82.1	1.1	2.2	32.4	160.0	118.6	274.8	7.3	(NA)	(D)
Michigan	E5	12	4	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Minnesota	—	10	6	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.9	(NA)	(NA)
Mississippi	—	4	3	.2	4.8	.1	.2	2.7	7.2	2.9	10.0	.2	(NA)	(D)
Missouri	—	4	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
New Hampshire	—	10	6	.3	9.4	.1	.3	4.0	13.1	6.8	19.6	.3	G	(D)
New Jersey	—	20	8	.5	20.5	.2	.5	7.0	37.6	38.1	78.6	1.3	.3	19.1
New Mexico	—	3	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New York	E1	40	17	1.3	42.3	.7	1.6	19.4	86.1	50.0	137.0	3.1	1.3	73.2
Ohio	—	9	4	.8	24.6	.6	1.6	13.2	65.8	28.8	95.8	4.3	F	(D)
Oregon	—	13	4	.9	30.9	.5	1.1	15.6	69.7	34.7	99.0	(D)	F	(D)
Pennsylvania	E1	24	7	.6	15.6	.4	.7	8.8	26.7	17.2	45.5	2.0	.5	21.3
South Dakota	—	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Texas	E1	9	1	.1	2.6	.1	.2	1.3	6.1	5.2	11.9	(D)	F	(D)
Vermont	E1	6	3	.2	4.5	.1	.2	2.5	11.0	5.3	15.8	.3	(NA)	(NA)
Washington	E5	5	2	.1	3.2	.1	.1	1.3	7.3	3.1	10.4	(D)	(NA)	(NA)
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.														
United States	—	1 006	318	38.1	1 305.4	19.3	38.1	483.6	2 809.5	1 584.2	4 400.1	180.1	41.0	2 259.0
Alabama	—	7	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.1	(NA)	(D)
Arizona	E3	15	6	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	(NA)	(NA)
California	E1	163	62	6.0	223.0	3.0	5.9	81.6	445.5	149.1	596.7	19.5	5.0	289.1
Colorado	E3	29	6	.3	8.4	.2	.3	2.9	16.9	13.5	29.9	.7	E	(D)
Connecticut	E3	38	17	1.8	72.1	.8	1.6	20.3	143.5	41.7	175.9	7.5	2.5	134.2
Florida	—	44	7	1.2	30.0	.8	1.6	14.7	78.8	57.6	135.7	1.5	1.3	72.7
Georgia	—	10	2	.3	7.7	.2	.3	2.9	24.4	13.2	36.2	.6	(NA)	(D)
Illinois	—	44	16	1.4	50.3	.5	1.3	12.9	148.4	79.1	228.4	4.4	2.3	152.8
Indiana	E2	19	4	.3	7.6	.1	.2	2.7	15.9	10.7	28.1	.3	.2	7.0
Louisiana	—	4	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Maryland	E1	19	7	.8	26.9	.4	.8	9.1	54.6	39.3	99.6	1.6	1.1	41.5
Massachusetts	E1	58	18	2.5	97.3	1.3	2.3	42.0	208.0	99.6	308.6	7.6	3.0	198.0
Michigan	—	52	15	1.1	35.3	.5	1.1	13.0	65.2	42.3	111.1	1.6	1.1	43.8
Minnesota	—	26	7	1.6	62.1	.9	1.7	33.3	141.0	60.0	206.2	7.8	1.4	105.7
Missouri	—	9	2	.2	7.3	(Z)	.1	.9	17.2	5.0	22.1	.7	(NA)	(NA)
New Hampshire	—	8	5	.3	10.2	.1	.2	2.9	22.1	11.0	33.7	.7	.2	5.2
New Jersey	—	43	14	1.9	61.5	.9	1.8	20.3	124.0	98.6	226.2	16.5	1.9	113.0
New Mexico	—	6	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	(NA)	(D)
New York	E1	51	18	2.2	73.4	1.2	2.3	29.0	109.0	91.1	201.4	8.3	(NA)	(D)
North Carolina	—	23	7	1.0	28.0	.5	.9	9.5	76.9	35.2	111.3	3.6	F	(D)
Ohio	—	67	21	3.2	109.4	1.6	3.1	37.0	285.2	141.4	431.6	10.2	4.0	204.9
Oklahoma	—	10	3	.2	6.6	.1	.2	2.2	9.5	8.4	19.5	(D)	(NA)	(NA)
Pennsylvania	—	50	21	3.0	97.2	1.7	3.6	43.9	151.8	95.8	245.2	7.2	2.9	142.9
Rhode Island	—	7	4	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	9.6
Tennessee	—	16	5	.7	26.9	.4	.8	11.0	59.6	37.5	95.9	1.9	.6	39.4
Texas	—	73	24	3.7	122.1	2.0	4.0	46.0	317.6	289.0	594.8	69.0	2.3	124.4
Utah	—	6	2	.2	6.8	.1	.2	1.8	16.6	7.5	23.6	.5	(NA)	(NA)
Vermont	—	3	1	F	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(D)
Virginia	—	7	2	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Washington	E1	29	5	.9	27.9	.4	.9	11.4	51.6	18.0	68.5	1.9	2.1	141.0
West Virginia	—	1	1	C	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Wisconsin	—	17	5	.4	8.9	.3	.5	4.2	28.2	21.7	48.8	1.2	.4	18.4

See footnotes at end of table.

Table 2. Industry Statistics for Selected States: 1992 and 1987—Con.

Note: For qualifications of data, see footnotes on table 1a.

¹Payroll and sales data for some small single-establishment companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other Government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown for those States where estimated value of shipments data based on administrative-record data account for 10 percent or more of figure shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

²Statistics for some producing States have been withheld to avoid disclosing data for individual companies. However, for States with 100 employees or more, number of establishments is shown and employment-size range is indicated by one of the following symbols: C—100 to 249 employees; E—250 to 499 employees; F—500 to 999 employees; G—1,000 to 2,499 employees; H—2,500 to 4,999 employees; I—5,000 to 9,999 employees; J—10,000 to 24,999 employees; K—25,000 to 49,999 employees; L—50,000 to 99,999 employees; M—100,000 employees or more.

Table 3a. Summary Statistics for the Industry: 1992

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Search and navigation equipment (SIC 3812)	Laboratory apparatus and furniture (SIC 3821)	Environmental controls (SIC 3822)	Process control instruments (SIC 3823)	Fluid meters and counting devices (SIC 3824)	Instruments to measure electricity (SIC 3825)	Analytical instruments (SIC 3826)	Optical instruments and lenses (SIC 3827)	Measuring and controlling devices, n.e.c. (SIC 3829)
Companies -----number...	634	330	294	817	181	900	551	415	977
All establishments -----number...	769	342	318	885	193	964	593	425	1 006
With 1 to 19 employees -----number...	360	199	188	527	119	576	366	258	688
With 20 to 99 employees -----number...	174	98	79	226	37	255	146	132	231
With 100 employees or more -----number...	235	45	51	132	37	133	81	35	87
Employment and labor costs:									
Employees -----1,000...	255.0	17.7	25.0	50.1	16.2	68.7	39.7	18.9	38.1
Compensation, total -----mil dol...	14 035.7	707.9	891.3	2 197.4	701.1	3 077.9	1 815.7	860.0	1 621.0
Annual payroll -----mil dol...	11 056.2	571.6	685.4	1 764.8	533.7	2 549.0	1 478.1	679.9	1 305.4
Fringe benefits -----mil dol...	2 979.5	136.3	205.8	432.6	167.4	528.9	337.6	180.1	315.6
Social Security and other legally required payments -----mil dol...	965.8	52.2	76.8	170.1	64.7	236.4	126.9	64.5	130.3
Employer voluntary payments -----mil dol...	2 013.7	84.2	129.0	262.5	102.6	292.5	210.8	115.6	185.3
Production workers:									
Average for year -----1,000...	103.6	9.0	16.8	24.0	11.3	32.3	15.2	9.4	19.3
March -----1,000...	108.0	8.9	16.6	24.4	11.6	33.3	15.3	9.8	19.8
May -----1,000...	105.4	9.0	17.1	24.2	11.7	32.7	15.3	9.5	19.5
August -----1,000...	101.6	9.1	17.0	24.0	10.8	32.0	15.3	9.3	19.1
November -----1,000...	99.6	9.0	16.7	23.6	11.2	31.1	15.1	9.1	18.7
Hours -----millions...	203.1	18.4	32.1	47.3	21.6	63.4	29.6	19.8	38.1
Wages -----mil dol...	3 511.8	213.9	356.0	582.9	331.8	896.8	394.3	256.7	483.6
Cost of materials ¹ -----mil dol...	10 115.8	817.1	997.1	2 137.7	1 117.5	3 091.2	2 205.5	836.0	1 584.2
Materials, parts, containers, etc., consumed ² -----mil dol...	8 758.8	685.1	805.7	1 918.5	1 039.3	2 578.7	1 899.2	729.7	1 348.7
Resales -----mil dol...	99.6	75.7	122.3	115.2	34.3	349.3	245.9	49.9	154.0
Fuels -----mil dol...	28.4	5.0	4.4	10.5	2.8	14.9	5.2	4.0	5.4
Purchased electricity -----mil dol...	268.1	14.8	21.8	44.0	15.5	60.0	28.9	30.3	35.3
Contract work -----mil dol...	960.9	36.5	43.0	49.6	25.6	88.3	26.3	22.0	40.7
Quantity of electric energy used for heat and power:									
Purchased -----mil kWh...	4 169.7	220.3	360.9	621.9	269.0	849.8	384.6	393.7	485.3
Generated less sold -----mil kWh...	(D)	-	-	(D)	-	(D)	(D)	-	(D)
Total value of shipments -----mil dol...	35 266.1	2 106.0	2 607.1	6 360.4	2 601.5	8 873.3	5 191.3	2 262.9	4 400.1
Value added -----mil dol...	24 411.1	1 314.9	1 633.0	4 182.9	1 469.2	5 721.1	3 004.8	1 435.0	2 809.5
Inventories by stage of fabrication:									
Beginning of 1992 -----mil dol...	8 296.5	359.3	372.9	1 289.3	290.7	2 022.6	977.1	512.4	1 079.6
Finished goods -----mil dol...	305.3	90.7	110.4	294.7	55.3	419.3	359.1	100.0	222.9
Work in process -----mil dol...	6 787.8	98.7	160.7	453.6	129.5	854.9	227.0	254.4	431.4
Materials and supplies -----mil dol...	1 203.3	170.0	101.7	541.0	105.9	748.4	390.9	157.9	425.2
End of 1992 -----mil dol...	7 408.2	376.2	409.9	1 246.4	280.4	1 891.4	992.4	513.7	1 076.7
Finished goods -----mil dol...	287.3	124.3	134.6	274.1	51.7	409.4	377.1	97.4	252.1
Work in process -----mil dol...	6 066.6	91.1	159.5	434.2	118.3	803.8	228.0	265.2	395.8
Materials and supplies -----mil dol...	1 054.2	160.8	115.8	538.1	110.4	678.2	387.2	151.0	428.8

Note: For qualifications of data, see footnotes on table 1a.

¹Data on purchased services for the repair of buildings and machinery and for communication services are not included in cost of materials, etc., but are shown in table 3c.

²Data on materials consumed by type are shown in table 7. Data on amount purchased or transferred from foreign sources are shown in table 3c.

Table 3b. Gross Book Value of Depreciable Assets, Capital Expenditures, Retirements, Depreciation, and Rental Payments: 1992

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Search and navigation equipment (SIC 3812)	Laboratory apparatus and furniture (SIC 3821)	Environmental controls (SIC 3822)	Process control instruments (SIC 3823)	Fluid meters and counting devices (SIC 3824)	Instruments to measure electricity (SIC 3825)	Analytical instruments (SIC 3826)	Optical instruments and lenses (SIC 3827)	Measuring and controlling devices, n.e.c. (SIC 3829)
Gross book value of depreciable assets:									
Total:									
Beginning of year	15 149.5	604.8	800.2	1 496.7	804.7	3 300.6	1 496.4	854.8	1 233.6
New capital expenditures ¹	859.1	55.4	81.3	158.1	74.1	324.7	227.8	65.0	180.1
Used capital expenditures	108.7	8.0	1.5	20.8	2.8	89.1	19.3	6.6	21.8
Retirements	895.2	26.5	45.1	53.3	33.4	276.6	92.2	35.0	64.9
End of year	15 222.1	641.7	837.9	1 622.4	848.1	3 437.8	1 651.3	891.4	1 370.6
Buildings and other structures:									
Beginning of year	4 495.6	162.6	198.2	395.8	121.7	1 030.4	394.8	221.8	372.5
New capital expenditures	153.6	15.6	8.8	23.4	6.7	33.0	85.2	7.1	24.4
Used capital expenditures	85.5	(D)	.7	(D)	.5	(D)	3.9	3.9	11.5
Retirements	121.4	(D)	5.6	(D)	1.8	(D)	15.1	5.3	5.1
End of year	4 613.2	178.1	202.1	430.3	127.1	1 076.0	468.7	227.6	403.3
Machinery and equipment:									
Beginning of year	10 653.9	442.2	602.0	1 101.0	683.0	2 270.2	1 101.6	633.0	861.1
New capital expenditures ¹	705.5	39.9	72.5	134.7	67.4	291.7	142.6	57.9	155.7
Used capital expenditures	23.2	(D)	.8	(D)	2.3	(D)	15.4	2.7	10.3
Retirements	773.7	(D)	39.5	(D)	31.6	(D)	77.1	29.8	59.9
End of year	10 608.9	463.6	635.8	1 192.1	721.0	2 361.8	1 182.5	663.8	967.3
Depreciation charges during 1992:									
Total	1 179.8	53.6	60.0	140.7	119.9	279.0	152.7	86.0	117.4
Buildings and other structures	227.0	10.2	7.7	23.9	8.7	46.3	22.0	11.4	19.7
Machinery and equipment	952.7	43.4	52.3	116.8	111.3	232.6	130.7	74.6	97.7
Rental payments:									
Total	336.6	19.6	32.9	80.6	15.4	111.7	61.9	35.2	52.2
Buildings and other structures	236.5	12.0	18.0	50.3	8.4	69.0	41.8	18.2	32.1
Machinery and equipment	100.1	7.6	14.8	30.3	7.0	42.8	20.1	17.0	20.2

¹Data on new machinery and equipment expenditures by type are provided in table 3c.

Table 3c. Supplemental Industry Statistics Based on Sample Estimates: 1992

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Search and navigation equipment (SIC 3812)		Laboratory apparatus and furniture (SIC 3821)		Environmental controls (SIC 3822)		Process control instruments (SIC 3823)	
	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)
Purchased services:								
Cost of purchased services for the repair of—								
Buildings and other structures	87.9	(X)	2.4	(X)	5.3	(X)	12.4	(X)
Response coverage ratio (percent) ²	83.1	(X)	92.0	(X)	73.7	(X)	57.0	(X)
Machinery	101.2	(X)	8.3	(X)	12.2	(X)	14.6	(X)
Response coverage ratio (percent) ²	81.3	(X)	91.8	(X)	76.2	(X)	53.1	(X)
Other purchased services:								
Communications	91.4	(X)	9.5	(X)	10.5	(X)	25.6	(X)
Response coverage ratio (percent) ²	80.3	(X)	88.7	(X)	78.8	(X)	52.7	(X)
Legal	66.9	(X)	3.9	(X)	3.1	(X)	27.4	(X)
Response coverage ratio (percent) ²	77.7	(X)	92.0	(X)	61.8	(X)	56.7	(X)
Accounting and bookkeeping	15.7	(X)	2.7	(X)	2.9	(X)	4.4	(X)
Response coverage ratio (percent) ²	76.9	(X)	92.0	(X)	73.8	(X)	50.9	(X)
Advertising	36.1	(X)	14.3	(X)	6.4	(X)	38.2	(X)
Response coverage ratio (percent) ²	81.0	(X)	86.6	(X)	73.4	(X)	55.5	(X)
Software and other data processing	152.5	(X)	4.7	(X)	71.5	(X)	16.4	(X)
Response coverage ratio (percent) ²	81.0	(X)	88.7	(X)	76.8	(X)	54.4	(X)
Refuse removal, including hazardous waste	25.2	(X)	2.6	(X)	1.6	(X)	2.8	(X)
Response coverage ratio (percent) ²	80.5	(X)	83.3	(X)	81.6	(X)	51.5	(X)
New machinery and equipment expenditures	705.5	(X)	39.9	(X)	72.5	(X)	134.7	(X)
Automobiles, trucks, etc., for highway use	4.0	33	1.0	17	.4	33	4.2	54
Computers and peripheral data processing equipment	201.9	1	10.2	5	11.5	8	44.7	4
All other	499.7	1	28.7	3	60.6	2	85.8	4
Adjustment ratio ³	1.1	(X)	1.3	(X)	1.1	(X)	1.4	(X)
Cost of materials, components, parts, etc., used	8 758.8	(X)	685.1	(X)	805.7	(X)	1 918.5	(X)
Materials purchased or transferred from foreign sources ⁴	268.7	1	37.4	23	59.4	10	(S)	(X)
Materials purchased or transferred from domestic sources	8 490.1	1	647.6	2	746.4	1	(S)	(X)
Adjustment ratio ³	1.7	(X)	1.6	(X)	1.6	(X)	(S)	(X)

See footnotes at end of table.

Table 3c. Supplemental Industry Statistics Based on Sample Estimates: 1992—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Fluid meters and counting devices (SIC 3824)		Instruments to measure electricity (SIC 3825)		Analytical instruments (SIC 3826)		Optical instruments and lenses (SIC 3827)		Measuring and controlling devices, n.e.c. (SIC 3829)	
	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)	Amount (million dollars)	Relative standard error of estimate ¹ (percent)
Purchased services:										
Cost of purchased services for the repair of—										
Buildings and other structures	1.8	(X)	22.5	(X)	8.7	(X)	4.9	(X)	5.9	(X)
Response coverage ratio (percent) ²	78.9	(X)	73.0	(X)	67.7	(X)	82.0	(X)	62.8	(X)
Machinery	7.7	(X)	25.7	(X)	17.8	(X)	8.1	(X)	31.5	(X)
Response coverage ratio (percent) ²	80.1	(X)	71.6	(X)	69.0	(X)	82.0	(X)	63.1	(X)
Other purchased services:										
Communications	4.5	(X)	37.1	(X)	28.7	(X)	7.3	(X)	15.3	(X)
Response coverage ratio (percent) ²	80.3	(X)	67.8	(X)	67.4	(X)	81.2	(X)	65.9	(X)
Legal	1.9	(X)	19.8	(X)	15.3	(X)	7.9	(X)	7.9	(X)
Response coverage ratio (percent) ²	65.6	(X)	71.4	(X)	68.0	(X)	81.3	(X)	67.8	(X)
Accounting and bookkeeping	1.6	(X)	8.2	(X)	10.2	(X)	3.7	(X)	6.1	(X)
Response coverage ratio (percent) ²	66.0	(X)	70.5	(X)	68.9	(X)	82.0	(X)	67.3	(X)
Advertising	4.8	(X)	54.1	(X)	32.7	(X)	12.8	(X)	22.1	(X)
Response coverage ratio (percent) ²	64.9	(X)	71.8	(X)	69.0	(X)	82.0	(X)	67.2	(X)
Software and other data processing	1.7	(X)	20.3	(X)	16.7	(X)	5.0	(X)	15.0	(X)
Response coverage ratio (percent) ²	66.0	(X)	71.1	(X)	67.7	(X)	81.1	(X)	66.5	(X)
Refuse removal, including hazardous waste	3.7	(X)	4.2	(X)	4.3	(X)	2.4	(X)	3.2	(X)
Response coverage ratio (percent) ²	80.3	(X)	67.9	(X)	67.6	(X)	78.1	(X)	66.9	(X)
New machinery and equipment expenditures	67.4	(X)	291.7	(X)	142.6	(X)	57.9	(X)	155.7	(X)
Automobiles, trucks, etc., for highway use	4	12	1.8	12	3.7	11	.3	36	20.5	7
Computers and peripheral data processing equipment	7.4	5	99.8	2	23.6	7	9.7	13	51.1	5
All other	59.6	1	190.1	1	115.3	2	47.8	3	84.1	5
Adjustment ratio ³	1.2	(X)	1.1	(X)	1.1	(X)	1.3	(X)	1.3	(X)
Cost of materials, components, parts, etc., used	1 039.3	(X)	2 578.7	(X)	1 899.2	(X)	729.7	(X)	1 348.7	(X)
Materials purchased or transferred from foreign sources ⁴	(S)	(X)	211.9	8	(S)	(X)	44.8	20	60.8	9
Materials purchased or transferred from domestic sources	(S)	(X)	2 366.9	1	(S)	(X)	685.0	2	1 288.0	1
Adjustment ratio ³	(S)	(X)	2.0	(X)	(S)	(X)	1.6	(X)	2.0	(X)

Note: The amounts shown for purchased services reflect only those services that establishments purchase from other companies. Amounts purchased by separate central administrative offices and services provided to establishments by central administrative offices are excluded.

¹For description of relative standard error of estimate, see Qualifications of the Data in appendixes.

²A response coverage ratio is derived for this item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight, see appendix B) for those ASM establishments that reported to the weighted total employment for all ASM establishments classified in the industry.

³Detail has been adjusted upwards to account for nonresponse. Inverse of the ratio shown represents a measure of the response of the inquiry. (See appendixes for further explanation.)

⁴Data may understate the true cost of imported parts, components, and supplies since some respondents do not know the origin of these materials. Includes cases where materials were purchased from secondary suppliers or where they were transferred from company-operated warehouses or other distribution points. Direct purchases from foreign suppliers and importers by domestic manufacturing establishments are believed to be reported accurately.

Table 4. Industry Statistics by Employment Size of Establishment: 1992

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E ¹	All establishments (no.)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT												
Total	-	769	255.0	11 056.2	103.6	203.1	3 511.8	24 411.1	10 115.8	35 266.1	859.1	7 408.2
Establishments with an average of—												
1 to 4 employees	E9	152	.3	7.4	.1	.2	2.4	15.8	6.7	22.4	.6	4.6
5 to 9 employees	E6	116	.8	22.3	.3	.6	7.3	46.4	20.3	66.8	1.8	13.0
10 to 19 employees	E3	92	1.3	35.9	.6	1.3	13.4	81.1	30.9	109.9	2.0	23.8
20 to 49 employees	E2	106	3.3	104.2	1.6	3.0	37.7	240.7	133.9	376.3	9.2	70.9
50 to 99 employees	E3	68	4.7	161.0	2.4	4.7	58.2	365.9	214.1	578.3	11.5	148.3
100 to 249 employees	E2	79	12.7	440.3	6.1	12.3	157.3	959.9	474.6	1 458.8	29.5	332.0
250 to 499 employees	E1	50	18.3	674.7	10.2	18.7	283.2	1 397.4	594.3	2 015.6	47.6	375.0
500 to 999 employees	-	40	29.3	1 156.4	13.5	27.6	393.9	2 622.6	1 164.7	3 906.6	83.5	748.9
1,000 to 2,499 employees	-	40	65.5	2 952.5	23.0	44.8	790.6	5 743.2	2 447.5	8 407.5	260.4	1 866.6
2,500 employees or more	-	26	118.8	5 501.5	45.7	89.9	1 767.7	12 938.1	5 028.6	18 323.9	413.0	3 825.1
Covered by administrative records ²	E9	252	1.3	28.4	.5	1.0	9.3	57.6	24.5	82.1	2.3	16.9
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE												
Total	-	342	17.7	571.6	9.0	18.4	213.9	1 314.9	817.1	2 106.0	55.4	376.2
Establishments with an average of—												
1 to 4 employees	E8	69	.1	3.5	.1	.2	1.3	7.8	4.7	12.5	.3	2.4
5 to 9 employees	E4	57	.4	10.2	.2	.4	4.1	24.8	13.6	38.1	1.2	6.9
10 to 19 employees	E2	73	1.0	29.6	.5	1.0	11.0	61.8	31.0	92.8	1.8	15.7
20 to 49 employees	E1	74	2.3	66.6	1.2	2.4	26.8	158.0	75.6	230.6	5.2	45.0
50 to 99 employees	-	24	1.7	55.5	.8	1.7	19.4	124.1	72.3	195.2	4.3	34.3
100 to 249 employees	-	28	4.5	137.8	2.4	5.1	58.9	301.9	184.8	487.8	13.7	85.6
250 to 499 employees	-	14	4.7	156.8	2.4	4.9	59.6	381.8	220.5	607.7	20.1	126.1
500 to 999 employees	-	2	3.0	111.5	1.3	2.7	32.7	254.9	214.6	441.2	8.9	60.4
1,000 to 2,499 employees	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	105	.4	10.8	.2	.5	4.2	21.3	11.7	33.0	.9	6.6

See footnotes at end of table.

38A-18 SEARCH & NAV. EQUIP.; MEASUR., CNTRL., OPT. INSTR.

MANUFACTURES—INDUSTRY SERIES

Table 4. Industry Statistics by Employment Size of Establishment: 1992—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E ¹	All establishments (no.)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3822, ENVIRONMENTAL CONTROLS												
Total	-	318	25.0	685.4	16.8	32.1	356.0	1 633.0	997.1	2 607.1	81.3	409.9
Establishments with an average of—												
1 to 4 employees	E8	71	.1	3.0	.1	.2	1.6	6.2	4.0	10.1	.2	1.7
5 to 9 employees	E6	54	.4	9.2	.2	.5	4.5	18.1	13.4	31.4	.6	5.6
10 to 19 employees	E2	63	.9	21.6	.5	1.1	10.3	48.2	31.2	78.5	1.4	13.5
20 to 49 employees	E1	55	1.7	44.8	1.0	1.9	18.7	109.2	61.7	168.7	4.3	30.7
50 to 99 employees	E2	24	1.7	43.3	1.1	2.2	19.6	91.7	66.7	157.4	3.4	32.5
100 to 249 employees	-	26	4.0	104.2	2.9	5.4	57.2	343.8	192.9	534.8	9.5	83.1
250 to 499 employees	-	11	3.7	79.0	2.9	5.7	49.4	200.1	127.5	327.7	15.1	44.3
500 to 999 employees	-	12	12.5	380.3	8.0	15.1	194.7	815.6	499.8	1 298.5	46.7	198.7
1,000 to 2,499 employees	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
2,500 employees or more	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	119	.6	11.8	.4	.7	6.3	23.6	15.2	38.9	1.0	6.5
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS												
Total	E1	885	50.1	1 764.8	24.0	47.3	582.9	4 182.9	2 137.7	6 360.4	158.1	1 246.4
Establishments with an average of—												
1 to 4 employees	E9	204	.4	10.9	.1	.3	3.7	25.0	13.5	38.5	.9	7.3
5 to 9 employees	E6	165	1.1	30.8	.5	1.0	10.8	66.3	37.4	103.8	2.3	19.7
10 to 19 employees	E2	158	2.2	67.6	1.0	2.0	23.3	144.9	88.3	234.3	4.0	42.0
20 to 49 employees	E1	141	4.5	149.4	2.0	4.0	46.6	319.3	163.4	485.3	7.7	87.2
50 to 99 employees	E1	85	5.9	193.9	3.1	6.3	74.8	446.4	250.5	697.9	15.3	133.0
100 to 249 employees	E1	92	13.8	454.5	6.9	13.6	164.1	1 045.2	561.4	1 627.6	35.0	328.4
250 to 499 employees	-	27	9.4	315.6	5.0	10.2	119.4	751.9	403.7	1 153.9	30.8	232.7
500 to 999 employees	E3	8	6.0	227.3	3.1	5.3	74.8	398.2	242.2	653.3	29.0	161.4
1,000 to 2,499 employees	-	5	6.9	314.9	2.3	4.5	65.4	985.7	377.3	1 365.8	33.3	234.7
Covered by administrative records ²	E9	320	1.4	33.7	.6	1.2	11.3	68.9	37.1	106.0	2.3	20.5
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES												
Total	-	193	16.2	533.7	11.3	21.6	331.8	1 469.2	1 117.5	2 601.5	74.1	280.4
Establishments with an average of—												
1 to 4 employees	E8	54	.1	2.1	.1	.1	1.1	5.9	4.0	9.9	.3	1.4
5 to 9 employees	E6	39	.3	6.4	.2	.3	3.2	15.4	11.6	26.9	.7	3.8
10 to 19 employees	E2	26	.4	9.5	.3	.6	5.3	20.0	14.4	34.0	1.1	5.4
20 to 49 employees	E3	27	.8	21.0	.5	1.0	9.8	43.7	29.3	74.8	1.7	14.5
50 to 99 employees	E1	10	.7	16.3	.4	.7	6.7	33.9	26.5	61.3	1.1	11.8
100 to 249 employees	-	23	3.8	98.6	2.5	5.3	51.4	253.0	213.5	466.3	15.2	89.0
250 to 499 employees	-	9	3.3	111.1	2.1	4.2	58.4	299.6	198.8	512.8	16.2	61.8
500 to 999 employees	-	3	6.9	268.8	5.3	9.4	195.9	797.6	619.4	1 415.5	37.8	92.8
1,000 to 2,499 employees	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
2,500 employees or more	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	72	.2	4.5	.2	.3	2.3	10.4	7.1	17.5	.6	2.4
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY												
Total	E1	964	68.7	2 549.0	32.3	63.4	896.8	5 721.1	3 091.2	8 873.3	324.7	1 891.4
Establishments with an average of—												
1 to 4 employees	E8	238	.4	12.8	.1	.4	4.9	24.1	13.9	39.2	1.2	9.1
5 to 9 employees	E7	176	1.2	36.5	.5	1.1	13.9	(Z)	166.3	112.1	3.2	25.8
10 to 19 employees	E3	162	2.2	62.2	1.0	1.9	21.3	120.6	64.5	185.1	4.3	39.3
20 to 49 employees	E1	175	5.4	177.8	2.4	4.8	58.2	374.9	210.7	594.2	15.1	139.2
50 to 99 employees	E2	80	5.6	194.0	2.7	5.7	66.1	429.8	232.2	664.4	19.5	139.7
100 to 249 employees	E1	78	12.5	430.5	5.4	10.7	131.6	1 105.0	501.0	1 600.0	91.6	365.2
250 to 499 employees	-	27	8.6	357.3	3.5	7.0	96.9	891.7	401.9	1 273.3	46.3	353.3
500 to 999 employees	E1	17	11.7	422.8	6.7	11.4	189.4	1 103.7	641.3	1 735.5	36.8	340.1
1,000 to 2,499 employees	-	10	21.2	855.1	9.9	20.5	314.6	1 725.2	859.4	2 669.4	106.7	479.7
2,500 employees or more	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	410	2.1	52.1	.9	1.8	20.4	94.2	51.4	145.6	4.8	34.5

See footnotes at end of table.

Table 4. Industry Statistics by Employment Size of Establishment: 1992—Con.

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E ¹	All establishments (no.)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 3826, ANALYTICAL INSTRUMENTS												
Total	—	593	39.7	1 478.1	15.2	29.6	394.3	3 004.8	2 205.5	5 191.3	227.8	992.4
Establishments with an average of—												
1 to 4 employees	E8	169	.3	8.5	.1	.2	2.5	19.9	12.0	31.6	.8	7.0
5 to 9 employees	E5	112	.8	23.7	.3	.7	7.1	52.9	31.4	81.9	2.7	18.1
10 to 19 employees	E2	85	1.2	38.7	.5	1.1	13.2	80.1	41.6	122.5	3.2	21.2
20 to 49 employees	E1	88	2.8	93.2	1.1	2.3	28.0	186.5	118.1	301.5	6.0	58.3
50 to 99 employees	E1	58	4.1	155.0	1.4	3.0	37.2	341.9	191.2	527.9	13.1	105.4
100 to 249 employees	E1	43	6.6	230.1	2.6	4.9	64.4	567.3	337.0	904.7	31.2	159.9
250 to 499 employees	—	23	7.7	296.9	3.2	5.6	73.9	678.4	508.6	1 183.5	23.6	213.4
500 to 999 employees	—	11	7.5	282.9	3.4	7.1	98.8	607.5	498.5	1 106.4	102.6	240.4
1,000 to 2,499 employees	—	3	8.8	349.1	2.5	4.8	69.2	470.3	467.2	931.2	44.5	168.8
2,500 employees or more	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	231	.8	20.4	.3	.7	5.9	42.0	26.0	68.0	2.0	13.2
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES												
Total	—	425	18.9	679.9	9.4	19.8	256.7	1 435.0	836.0	2 262.9	65.0	513.7
Establishments with an average of—												
1 to 4 employees	E8	124	.2	6.2	.1	.3	2.9	14.0	7.9	21.8	.6	5.6
5 to 9 employees	E6	67	.5	12.9	.3	.5	5.8	28.1	14.4	42.5	2.0	9.6
10 to 19 employees	E2	67	.9	26.2	.5	1.0	12.0	50.7	23.5	74.7	2.0	12.9
20 to 49 employees	—	88	2.8	88.3	1.5	3.1	38.0	162.2	187.3	334.5	5.7	151.9
50 to 99 employees	—	44	3.1	107.3	1.7	3.8	50.1	221.0	128.4	341.5	11.7	76.5
100 to 249 employees	—	22	3.6	110.3	1.9	3.8	46.5	219.0	172.6	390.4	15.0	86.1
250 to 499 employees	—	7	2.4	86.5	1.1	2.2	34.1	185.5	93.5	284.3	6.3	80.3
500 to 999 employees	—	5	5.4	242.2	2.2	5.1	67.4	554.6	208.4	773.1	21.8	90.7
1,000 to 2,499 employees	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	176	.7	16.9	.4	.8	7.7	33.5	18.5	52.0	1.6	13.8
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.												
Total	—	1 006	38.1	1 305.4	19.3	38.1	483.6	2 809.5	1 584.2	4 400.1	180.1	1 076.7
Establishments with an average of—												
1 to 4 employees	E8	388	.6	16.8	.4	.7	6.8	34.1	21.0	54.9	1.6	14.1
5 to 9 employees	E3	140	.9	22.3	.5	.9	8.8	71.4	27.8	99.3	3.4	16.8
10 to 19 employees	E1	160	2.2	68.5	1.1	2.3	25.2	151.1	101.4	253.2	4.0	42.5
20 to 49 employees	E1	162	5.0	162.5	2.5	5.3	61.2	327.3	194.8	520.5	11.7	113.5
50 to 99 employees	E1	69	5.1	171.1	2.4	4.7	56.4	366.8	239.9	617.7	11.9	142.1
100 to 249 employees	—	59	9.1	310.0	4.2	8.3	95.0	640.3	364.9	980.0	42.5	269.8
250 to 499 employees	—	17	6.1	216.6	3.2	6.4	74.1	559.2	358.4	916.1	23.9	189.0
500 to 999 employees	—	10	9.0	337.7	5.0	9.4	156.2	659.4	276.0	958.5	81.2	288.8
1,000 to 2,499 employees	—	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records ²	E9	414	1.1	24.0	.7	1.2	9.5	47.7	29.1	76.8	2.5	21.1

Note: For qualifications of data, see footnotes on table 1a. Data shown as (D) are included in underscored figures above.

¹Payroll and sales data for some small single-establishment manufacturing companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other Government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at the time data were tabulated. The following symbols are shown for those employment-size classes where estimated data based on administrative-record data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

²Report forms were not mailed to small single-establishment companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1992 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective employment-size classes shown.

Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1992

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry or product class code	Industry or primary product class	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3812	Search and navigation equipment: All establishments in industry	769	255.0	11 056.2	103.6	203.1	3 511.8	24 411.1	10 115.8	35 266.1	859.1
	Establishments with this product class primary:										
38121	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals	75	19.8	717.1	8.4	17.3	215.3	1 659.0	916.7	2 658.7	73.7
38122	Search, detection, navigation, and guidance systems and equipment	273	228.0	10 119.8	92.0	179.3	3 221.3	22 309.1	9 000.4	31 970.1	768.0
3821	Laboratory apparatus and furniture: All establishments in industry	342	17.7	571.6	9.0	18.4	213.9	1 314.9	817.1	2 106.0	55.4

See footnotes at end of table.

38A-20 SEARCH & NAV. EQUIP.; MEASUR., CNTRL., OPT. INSTR.

MANUFACTURES—INDUSTRY SERIES

Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1992—
Con.

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry or product class code	Industry or primary product class	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
3822	Environmental controls: All establishments in industry -----	318	25.0	685.4	16.8	32.1	356.0	1 633.0	997.1	2 607.1	81.3
3823	Process control instruments: All establishments in industry -----	885	50.1	1 764.8	24.0	47.3	582.9	4 182.9	2 137.7	6 360.4	158.1
3824	Fluid meters and counting devices: All establishments in industry -----	193	16.2	533.7	11.3	21.6	331.8	1 469.2	1 117.5	2 601.5	74.1
	Establishments with this product class primary:										
38242	Integrating and totalizing meters for gas and liquids --	40	5.9	181.6	3.7	7.1	94.1	505.9	309.6	817.1	32.7
38243	Counting devices -----	23	2.1	63.8	1.3	2.8	30.7	147.6	118.8	281.5	6.8
38244	Motor vehicle instruments -----	19	7.0	262.4	5.5	10.1	193.5	761.9	649.8	1 409.7	32.0
3825	Instruments to measure electricity: All establishments in industry -----	964	68.7	2 549.0	32.3	63.4	896.8	5 721.1	3 091.2	8 873.3	324.7
	Establishments with this product class primary:										
38251	Integrating instruments, electrical -----	16	4.9	141.0	3.5	6.3	84.3	248.5	226.5	480.7	12.8
38252	Test equipment for testing electrical, radio, and communication circuits, and motors -----	323	52.3	2 042.2	23.3	45.9	679.8	4 776.3	2 487.7	7 302.6	283.5
38253	Other instruments to measure electricity -----	63	6.0	203.6	2.9	5.9	70.1	388.9	209.9	614.4	14.7
3826	Analytical instruments: All establishments in industry -----	593	39.7	1 478.1	15.2	29.6	394.3	3 004.8	2 205.5	5 191.3	227.8
3827	Optical instruments and lenses: All establishments in industry -----	425	18.9	679.9	9.4	19.8	256.7	1 435.0	836.0	2 262.9	65.0
	Establishments with this product class primary:										
38271	Sighting, tracking, and fire-control equipment, optical-type -----	32	4.4	175.8	1.7	3.4	47.3	395.4	347.9	744.0	12.9
38274	Optical instruments and lenses, n.e.c. -----	174	13.1	469.5	6.9	14.8	193.1	971.4	452.3	1 414.8	48.0
3829	Measuring and controlling devices, n.e.c.: All establishments in industry -----	1 006	38.1	1 305.4	19.3	38.1	483.6	2 809.5	1 584.2	4 400.1	180.1
	Establishments with this product class primary:										
38291	Aircraft engine instruments, except flight -----	31	5.9	204.9	3.3	6.1	91.4	343.9	205.2	559.6	13.1
38292	Physical properties testing and inspection equipment and kinematic testing and measuring equipment -----	174	10.7	389.4	5.0	10.1	140.5	806.5	440.9	1 251.4	31.1
38294	Nuclear radiation detection and monitoring instruments -----	45	4.8	164.8	2.3	4.7	58.0	380.7	203.2	582.1	16.2
38295	Commercial, geophysical, meteorological, and general-purpose instruments -----	144	10.7	379.6	5.4	11.2	129.2	882.1	498.6	1 370.2	103.5
38296	Survey and drafting instruments and associated equipment -----	27	2.0	59.1	1.2	2.1	24.7	169.7	85.5	262.4	5.7

Note: For qualifications of data, see footnotes on table 1a.

Table 5b. Industry-Product Analysis—Value of Industry and Primary Product Shipments; Specialization and Coverage Ratios: 1992 and Earlier Census Years

[Million dollars. An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work (total miscellaneous receipts). Subtotals for total value of shipments show this product pattern for an industry. Primary products specialization ratio is the primary products value of shipments divided by the sum of primary products value of shipments plus secondary products value of shipments. The extent of which an industry's primary products are shipped by establishments classified both in and out of an industry is the coverage ratio and is calculated by dividing the primary products value of shipments by the value of primary products shipments made in all industries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry	1992	1987	1982
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT			
Total value of shipments -----	35 266.1	36 266.8	(NA)
Primary products value of shipments -----	29 984.2	30 632.7	(NA)
Secondary products value of shipments -----	2 944.4	3 909.9	(NA)
Total miscellaneous receipts -----	2 337.5	1 724.2	(NA)
Value of resales -----	186.0	89.6	(NA)
Contract receipts -----	29.3	35.2	(NA)
Other miscellaneous receipts -----	2 122.1	1 599.4	(NA)
Receipts for research and development -----	1 064.7	1 172.0	(NA)
Other miscellaneous receipts -----	1 041.4	427.4	(NA)
Other miscellaneous receipts, n.s.k. -----	16.0	(NA)	(NA)
Primary products specialization ratio -----	91	89	(NA)
Value of primary products shipments made in all industries -----	34 435.0	34 016.9	(NA)
Value of primary products shipments made in this industry -----	29 984.2	30 632.7	(NA)
Value of primary products shipments made in other industries -----	4 450.8	3 384.2	(NA)
Coverage ratio -----	87	90	(NA)

MANUFACTURES—INDUSTRY SERIES

SEARCH & NAV. EQUIP.; MEASUR., CNTRL., OPT. INSTR. 38A-21

Table 5b. Industry-Product Analysis—Value of Industry and Primary Product Shipments; Specialization and Coverage Ratios: 1992 and Earlier Census Years—Con.

[Million dollars. An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work (total miscellaneous receipts). Subtotals for total value of shipments show this product pattern for an industry. Primary products specialization ratio is the primary products value of shipments divided by the sum of primary products value of shipments plus secondary products value of shipments. The extent of which an industry's primary products are shipped by establishments classified both in and out of an industry is the coverage ratio and is calculated by dividing the primary products value of shipments by the value of primary products shipments made in all industries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry	1992	1987	1982
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE			
Total value of shipments	2 106.0	1 769.3	(NA)
Primary products value of shipments	1 663.8	1 482.9	(NA)
Secondary products value of shipments	277.5	174.8	(NA)
Total miscellaneous receipts	164.7	111.6	(NA)
Value of resales	136.3	73.7	(NA)
Contract receipts	11.6	(D)	(NA)
Other miscellaneous receipts	16.7	(D)	(NA)
Primary products specialization ratio	86	89	(NA)
Value of primary products shipments made in all industries	1 843.9	1 618.8	(NA)
Value of primary products shipments made in this industry	1 663.8	1 482.9	(NA)
Value of primary products shipments made in other industries	180.1	135.9	(NA)
Coverage ratio	90	92	(NA)
INDUSTRY 3822, ENVIRONMENTAL CONTROLS			
Total value of shipments	2 607.1	2 068.8	1 549.1
Primary products value of shipments	2 162.1	1 796.7	1 386.1
Secondary products value of shipments	183.1	147.5	119.1
Total miscellaneous receipts	261.9	124.5	43.9
Value of resales	192.7	73.6	36.2
Contract receipts	(D)	(D)	(D)
Other miscellaneous receipts	(D)	(D)	(D)
Primary products specialization ratio	92	92	92
Value of primary products shipments made in all industries	2 377.2	2 024.6	1 544.5
Value of primary products shipments made in this industry	2 162.1	1 796.7	1 386.1
Value of primary products shipments made in other industries	215.1	227.9	158.4
Coverage ratio	91	89	90
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS			
Total value of shipments	6 360.4	4 788.2	4 037.8
Primary products value of shipments	5 265.3	4 038.5	3 390.4
Secondary products value of shipments	403.3	367.1	379.6
Total miscellaneous receipts	691.8	382.6	267.8
Value of resales	165.9	122.3	95.3
Contract receipts	30.9	10.2	(D)
Other miscellaneous receipts	495.0	250.1	(D)
Receipts for repair work	58.6	26.2	39.4
Other miscellaneous receipts	384.3	223.9	(D)
Other miscellaneous receipts, n.s.k.	52.1	(NA)	.4
Primary products specialization ratio	93	92	91
Value of primary products shipments made in all industries	5 943.1	4 370.9	3 915.1
Value of primary products shipments made in this industry	5 265.3	4 038.5	3 390.4
Value of primary products shipments made in other industries	677.8	332.3	524.7
Coverage ratio	89	92	87
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES			
Total value of shipments	2 601.5	938.6	728.3
Primary products value of shipments	2 366.8	861.7	663.6
Secondary products value of shipments	175.0	46.7	47.1
Total miscellaneous receipts	59.7	30.3	17.6
Value of resales	40.6	25.0	9.7
Contract receipts	(D)	(D)	(D)
Other miscellaneous receipts	(D)	(D)	(D)
Receipts for repair work	(D)	(D)	4.5
Other miscellaneous receipts	(D)	(D)	(D)
Other miscellaneous receipts, n.s.k.	(D)	(NA)	(D)
Primary products specialization ratio	93	95	94
Value of primary products shipments made in all industries	2 734.7	1 133.1	787.1
Value of primary products shipments made in this industry	2 366.8	861.7	663.6
Value of primary products shipments made in other industries	367.9	271.4	123.4
Coverage ratio	87	76	84
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY			
Total value of shipments	8 873.3	7 703.3	6 094.4
Primary products value of shipments	7 494.2	6 972.9	5 058.2
Secondary products value of shipments	454.6	345.6	282.9
Total miscellaneous receipts	924.6	384.8	753.3
Value of resales	605.3	200.3	497.6
Contract receipts	17.9	22.7	(D)
Other miscellaneous receipts	301.3	161.8	(D)
Receipts for repair work	76.6	107.6	37.0
Other miscellaneous receipts	158.8	54.2	(D)
Other miscellaneous receipts, n.s.k.	66.0	(NA)	.9
Primary products specialization ratio	94	95	94
Value of primary products shipments made in all industries	8 066.8	7 612.3	5 575.6
Value of primary products shipments made in this industry	7 494.2	6 972.9	5 058.2
Value of primary products shipments made in other industries	572.6	639.4	517.4

Table 5b. Industry-Product Analysis-Value of Industry and Primary Product Shipments; Specialization and Coverage Ratios: 1992 and Earlier Census Years-Con.

[Million dollars. An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work (total miscellaneous receipts). Subtotals for total value of shipments show this product pattern for an industry. Primary products specialization ratio is the primary products value of shipments divided by the sum of primary products value of shipments plus secondary products value of shipments. The extent of which an industry's primary products are shipped by establishments classified both in and out of an industry is the coverage ratio and is calculated by dividing the primary products value of shipments by the value of primary products shipments made in all industries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry	1992	1987	1982
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY -Con.			
Coverage ratio -----	93	92	91
INDUSTRY 3826, ANALYTICAL INSTRUMENTS			
Total value of shipments -----	5 191.3	3 468.2	(NA)
Primary products value of shipments -----	4 207.3	2 844.0	(NA)
Secondary products value of shipments -----	481.6	441.5	(NA)
Total miscellaneous receipts -----	502.5	182.8	(NA)
Value of resales -----	373.7	123.8	(NA)
Contract receipts -----	34.9	(D)	(NA)
Other miscellaneous receipts -----	93.9	(D)	(NA)
Receipts for repair work -----	57.0	22.7	(NA)
Other miscellaneous receipts -----	34.7	(D)	(NA)
Other miscellaneous receipts, n.s.k. -----	2.3	(NA)	(NA)
Primary products specialization ratio -----	90	87	(NA)
Value of primary products shipments made in all industries -----	5 088.4	3 156.6	(NA)
Value of primary products shipments made in this industry -----	4 207.3	2 844.0	(NA)
Value of primary products shipments made in other industries -----	881.1	312.6	(NA)
Coverage ratio -----	83	90	(NA)
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES			
Total value of shipments -----	2 262.9	1 863.6	(NA)
Primary products value of shipments -----	1 907.8	1 595.7	(NA)
Secondary products value of shipments -----	230.3	161.7	(NA)
Total miscellaneous receipts -----	124.7	106.1	(NA)
Value of resales -----	72.9	79.4	(NA)
Contract receipts -----	(D)	17.7	(NA)
Other miscellaneous receipts -----	(D)	90.0	(NA)
Receipts for repair work -----	(D)	.7	(NA)
Other miscellaneous receipts -----	(D)	89.3	(NA)
Other miscellaneous receipts, n.s.k. -----	(D)	(NA)	(NA)
Primary products specialization ratio -----	89	91	(NA)
Value of primary products shipments made in all industries -----	2 287.7	1 990.2	(NA)
Value of primary products shipments made in this industry -----	1 907.8	1 595.7	(NA)
Value of primary products shipments made in other industries -----	379.8	394.5	(NA)
Coverage ratio -----	83	80	(NA)
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.			
Total value of shipments -----	4 400.1	3 442.0	(NA)
Primary products value of shipments -----	3 555.3	2 723.5	(NA)
Secondary products value of shipments -----	351.3	428.7	(NA)
Total miscellaneous receipts -----	493.5	289.7	(NA)
Value of resales -----	231.9	119.7	(NA)
Contract receipts -----	32.9	23.9	(NA)
Other miscellaneous receipts -----	228.7	146.1	(NA)
Receipts for repair work -----	46.8	34.8	(NA)
Other miscellaneous receipts -----	37.2	111.3	(NA)
Other miscellaneous receipts, n.s.k. -----	144.7	(NA)	(NA)
Primary products specialization ratio -----	91	86	(NA)
Value of primary products shipments made in all industries -----	4 337.2	3 389.3	(NA)
Value of primary products shipments made in this industry -----	3 555.3	2 723.5	(NA)
Value of primary products shipments made in other industries -----	781.9	665.8	(NA)
Coverage ratio -----	82	80	(NA)

Note: For qualifications of data, see footnotes on table 1a.

Table 6a. Product and Product Classes—Value of Shipments by All Producers: 1992 and 1987

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For meaning of abbreviations and symbols, see introductory text]

Product code	Product	1992		1987	
		Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)
3812—	SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL, AND NAUTICAL SYSTEMS, INSTRUMENTS, AND EQUIPMENT				
	Total	(NA)	34 435.0	(NA)	34 016.9
38121	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals	(NA)	2 551.3	(NA)	2 267.6
38121 00	Aeronautical, nautical, and navigational instruments, except aircraft engine instruments ²	110	2 551.3	129	2 267.6
38122	Search, detection, navigation, and guidance systems and equipment ..	(NA)	31 264.0	(NA)	30 886.3
38122 00	Search, detection, navigation, and guidance systems and equipment ²	255	31 264.0	244	30 886.3
38120	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment, n.s.k.	(NA)	619.7	(NA)	863.0
38120 00	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment, n.s.k. ³	(NA)	537.2	(NA)	715.2
38120 02	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment, n.s.k. ⁴	(NA)	82.5	(NA)	147.8
3821—	LABORATORY APPARATUS AND FURNITURE				
	Total	(NA)	1 843.9	(NA)	1 618.8
38210	Laboratory apparatus and furniture	(NA)	1 843.9	(NA)	1 618.8
38210 10	Laboratory and scientific apparatus ²	218	1 416.9	208	1 303.0
38210 20	Laboratory furniture and parts sold separately ²	33	289.0	(NA)	268.6
38210 00	Laboratory apparatus and furniture, n.s.k. ⁵	(NA)	105.0	(NA)	15.3
38210 02	Laboratory apparatus and furniture, n.s.k. ⁶	(NA)	33.0	(NA)	31.9
3822—	ENVIRONMENTAL CONTROLS				
	Total	(NA)	2 377.2	(NA)	2 024.6
38220	Automatic controls for monitoring residential and commercial environments and appliance regulating controls	(NA)	2 377.2	(NA)	2 024.6
38220 00	Controls for monitoring residential and commercial environments and appliance regulating controls ²	213	2 317.8	129	1 957.4
38220 02	Environmental controls, n.s.k. ⁹	(NA)	59.4	(NA)	67.2
3823—	PROCESS CONTROL INSTRUMENTS				
	Total	(NA)	5 943.1	(NA)	4 370.9
38230	Process control instruments	(NA)	5 943.1	(NA)	4 370.9
38230 00	Process control instruments ²	615	5 830.0	475	4 184.6
38230 02	Process control instruments, n.s.k. ⁴	(NA)	113.1	(NA)	186.4
3824—	FLUID METERS AND COUNTING DEVICES				
	Total	(NA)	2 734.7	(NA)	1 133.1
38242	Integrating and totalizing meters for gas and liquids	(NA)	775.3	(NA)	609.0
38242 00	Integrating and totalizing meters for gas and liquids ²	57	775.3	54	609.0
38243	Counting devices	(NA)	272.0	(NA)	219.3
38243 00	Counting devices, excluding motor vehicle instruments ²	41	272.0	51	219.3
38244	Motor vehicle instruments	(NA)	1 593.4	(NA)	241.2
38244 00	Motor vehicle instruments ²	35	1 593.4	30	241.2
38240	Fluid meters and counting devices, n.s.k.	(NA)	94.0	(NA)	63.6
38240 00	Fluid meters and counting devices, n.s.k. ⁷	(NA)	76.5	(NA)	31.7
38240 02	Fluid meters and counting devices, n.s.k. ⁸	(NA)	17.5	(NA)	31.9
3825—	INSTRUMENTS TO MEASURE ELECTRICITY				
	Total	(NA)	8 066.8	(NA)	7 612.3
38251	Integrating instruments, electrical	(NA)	445.2	(NA)	399.8
38251 00	Integrating instruments, electrical ²	32	445.2	23	399.8
38252	Test equipment for testing electrical, radio, and communication circuits, and motors	(NA)	6 610.0	(NA)	6 116.8
38252 00	Test equipment for testing electrical, radio, and communication circuits, and motors ²	374	6 610.0	402	6 116.8
38253	Other instruments to measure electricity	(NA)	559.5	(NA)	671.0
38253 00	Other instruments to measure electricity ²	92	559.5	98	671.0
38250	Instruments to measure electricity, n.s.k.	(NA)	452.1	(NA)	424.7
38250 00	Instruments to measure electricity, n.s.k. ³	(NA)	283.5	(NA)	163.1
38250 02	Instruments to measure electricity, n.s.k. ⁴	(NA)	168.6	(NA)	261.6

See footnotes at end of table.

38A-24 SEARCH & NAV. EQUIP.; MEASUR., CNTRL., OPT. INSTR.

MANUFACTURES—INDUSTRY SERIES

Table 6a. Product and Product Classes—Value of Shipments by All Producers: 1992 and 1987—Con.

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendixes. For meaning of abbreviations and symbols, see introductory text]

Product code	Product	1992		1987	
		Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)
3826—	ANALYTICAL INSTRUMENTS				
	Total	(NA)	5 088.4	(NA)	3 156.6
38260	Analytical and scientific instruments, except optical	(NA)	5 088.4	(NA)	3 156.6
38260 00	Analytical and scientific instruments (except optical) ²	370	5 019.2	282	3 050.0
38260 02	Analytical instruments, n.s.k. ⁴	(NA)	69.2	(NA)	106.6
3827—	OPTICAL INSTRUMENTS AND LENSES				
	Total	(NA)	2 287.7	(NA)	1 990.2
38271	Sighting, tracking, and fire-control equipment, optical-type	(NA)	786.5	(NA)	729.4
38271 00	Sighting, tracking, and fire-control equipment, optical-type ²	60	786.5	59	729.4
38274	Optical instruments and lenses, n.e.c.	(NA)	1 418.8	(NA)	1 205.9
38274 10	Binoculars and astronomical instruments ^{2 9}	16	68.0	15	36.3
38274 20	Other optical instruments and lenses (except sighting, tracking, and fire-control) ^{2 9}	193	1 259.5	159	1 169.6
38274 00	Optical instruments and lenses, n.e.c., n.s.k.	(NA)	91.4	(NA)	(NA)
38270	Optical instruments and lenses, n.s.k.	(NA)	82.3	(NA)	54.8
38270 00	Optical instruments and lenses, n.s.k. ³	(NA)	25.7	(NA)	—
38270 02	Optical instruments and lenses, n.s.k. ⁴	(NA)	56.7	(NA)	54.8
3829—	MEASURING AND CONTROLLING DEVICES, N.E.C.				
	Total	(NA)	4 337.2	(NA)	3 389.3
38291	Aircraft engine instruments, except flight	(NA)	622.6	(NA)	510.1
38291 00	Aircraft engine instruments, except flight ²	48	622.6	49	510.1
38292	Physical properties testing and inspection equipment and kinematic testing and measuring equipment	(NA)	1 170.6	(NA)	906.4
38292 00	Physical properties testing and inspection equipment and kinematic testing and measuring equipment ²	232	1 170.6	196	906.4
38294	Nuclear radiation detection and monitoring instruments	(NA)	579.6	(NA)	645.0
38294 00	Nuclear radiation detection and monitoring instruments ²	52	579.6	61	645.0
38295	Commercial, geophysical, meteorological, and general-purpose instruments	(NA)	1 409.5	(NA)	891.5
38295 00	Commercial, geophysical, meteorological, and general-purpose instruments ^{2 9}	187	1 409.5	(NA)	891.5
38296	Survey and drafting instruments and associated equipment	(NA)	243.5	(NA)	230.2
38296 00	Surveying and drafting instruments and apparatus, including photogrammetric equipment ²	37	243.5	45	230.2
38290	Measuring and controlling devices, n.e.c., n.s.k.	(NA)	311.3	(NA)	206.2
38290 00	Measuring and controlling devices, n.e.c., n.s.k. ⁷	(NA)	234.6	(NA)	64.6
38290 02	Measuring and controlling devices, n.e.c., n.s.k. ⁸	(NA)	76.8	(NA)	141.6

¹Data reported by all producers, not just those with shipments of \$100,000 or more.

²Additional detail is collected for this product in the Current Industrial Reports. For the survey number and title, see appendix C, part 3.

³Typically for establishments with 10 employees or more.

⁴Typically for establishments with less than 10 employees.

⁵Typically for establishments with 15 employees or more.

⁶Typically for establishments with less than 15 employees.

⁷Typically for establishments with 5 employees or more.

⁸Typically for establishments with less than 5 employees.

⁹For 1992, product code is revised. See appendix C, parts 1 and 2 for comparability.

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1992 and 1987

[Million dollars. Product classes shown are those where the data are geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by kind" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1992. For meaning of abbreviations and symbols, see introductory text]

Product class and geographic area	1992 value of product shipments	1987 value of product shipments	Product class and geographic area	1992 value of product shipments	1987 value of product shipments
38121, AERONAUTICAL, NAUTICAL, AND NAVIGATIONAL INSTRUMENTS, NOT SENDING OR RECEIVING RADIO SIGNALS			38253, OTHER INSTRUMENTS TO MEASURE ELECTRICITY		
United States	2 551.3	2 267.6	United States	559.5	671.0
California	216.8	261.5	California	107.0	165.8
Connecticut	136.0	109.6	Florida	16.9	10.2
Kansas	26.3	17.2	Illinois	14.6	25.5
Massachusetts	31.6	192.0	Massachusetts	50.8	52.5
Michigan	119.3	126.5	New Hampshire	56.4	60.8
New York	45.6	64.6	New York	57.0	21.6
Pennsylvania	187.0	205.1	Ohio	62.4	66.6
Texas	24.2	(NA)	Pennsylvania	29.2	42.1
Washington	74.7	(NA)	Texas	9.6	(NA)
38122, SEARCH, DETECTION, NAVIGATION, AND GUIDANCE SYSTEMS AND EQUIPMENT			38271, SIGHTING, TRACKING, AND FIRE-CONTROL EQUIPMENT, OPTICAL-TYPE		
United States	31 264.0	30 886.3	United States	786.5	729.4
Alabama	124.4	130.0	California	407.1	(NA)
Arizona	564.2	575.2	Florida	42.6	28.3
California	7 745.2	9 106.0	Massachusetts	81.2	79.6
Colorado	1 195.2	782.5	Michigan	17.6	(NA)
Connecticut	271.4	367.4	New Jersey	46.4	(NA)
Florida	2 039.4	1 585.5	New York	13.8	28.2
Maryland	2 523.3	2 119.0	38274, OPTICAL INSTRUMENTS AND LENSES, N.E.C.		
Massachusetts	2 118.3	1 929.1	United States	1 418.8	1 205.9
Michigan	128.0	(NA)	California	427.9	(NA)
Missouri	279.0	181.6	Colorado	9.2	(NA)
New Jersey	2 036.8	2 115.7	Florida	152.8	(NA)
New York	3 267.9	3 768.0	Connecticut	44.5	(NA)
North Carolina	147.7	135.5	Illinois	11.7	(NA)
Ohio	216.5	108.7	Maryland	30.6	(NA)
Oregon	139.3	(NA)	Massachusetts	240.9	(NA)
Pennsylvania	126.8	279.4	Michigan	9.1	(NA)
Texas	2 500.0	2 396.9	Minnesota	17.7	(NA)
Virginia	1 273.6	1 274.5	Missouri	14.6	(NA)
38242, INTEGRATING AND TOTALIZING METERS FOR GAS AND LIQUIDS			New Jersey	51.1	(NA)
United States	775.3	609.0	New York	149.8	(NA)
California	24.3	14.9	Ohio	83.9	(NA)
Ohio	14.9	(NA)	Oregon	38.8	(NA)
Pennsylvania	270.1	219.4	Pennsylvania	42.5	(NA)
Texas	68.1	32.9	Texas	5.6	(NA)
38243, COUNTING DEVICES			Vermont	12.2	(NA)
United States	272.0	219.3	38291, AIRCRAFT ENGINE INSTRUMENTS, EXCEPT FLIGHT		
Connecticut	11.6	34.0	United States	622.6	510.1
Illinois	66.9	59.4	California	50.5	114.2
New York	3.5	6.4	Minnesota	22.4	(NA)
38244, MOTOR VEHICLE INSTRUMENTS			Texas	8.1	9.4
United States	1 593.4	241.2	38292, PHYSICAL PROPERTIES TESTING AND INSPECTION EQUIPMENT AND KINEMATIC TESTING AND MEASURING EQUIPMENT		
Illinois	15.4	21.4	United States	1 170.6	906.4
New York	3.8	(NA)	California	138.5	147.6
Washington	7.4	(NA)	Colorado	5.7	(NA)
38251, INTEGRATING INSTRUMENTS, ELECTRICAL			Connecticut	29.2	26.7
United States	445.2	399.8	Illinois	45.6	(NA)
California	10.2	(NA)	Massachusetts	102.6	82.9
38252, TEST EQUIPMENT FOR TESTING ELECTRICAL, RADIO, AND COMMUNICATION CIRCUITS, AND MOTORS			Michigan	76.2	74.2
United States	6 610.0	6 116.8	New Jersey	54.8	44.7
Arizona	28.5	28.9	New York	75.4	67.0
California	2 096.6	1 626.0	North Carolina	40.8	(NA)
Connecticut	54.8	69.1	Ohio	134.8	42.7
Illinois	278.9	184.4	Pennsylvania	80.7	75.4
Massachusetts	589.4	571.3	Texas	14.6	17.0
Michigan	18.7	53.5	Wisconsin	7.9	7.9
Minnesota	177.2	(NA)	38294, NUCLEAR RADIATION DETECTION AND MONITORING INSTRUMENTS		
New Hampshire	14.8	68.4	United States	579.6	645.0
New Jersey	232.4	370.6	California	43.5	68.0
New York	327.1	478.0	Illinois	97.7	123.8
Ohio	97.9	113.9	Massachusetts	2.9	2.9
Pennsylvania	78.2	80.6	New Jersey	26.8	(NA)
Texas	112.5	89.2	New York	42.2	64.6
Virginia	25.7	38.2	Ohio	134.8	172.3
Washington	511.0	702.3	Pennsylvania	43.2	11.7
Wisconsin	93.8	39.1	Texas	45.3	(NA)

See footnotes at end of table.

Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1992 and 1987—Con.

[Million dollars. Product classes shown are those where the data are geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by kind" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1992. For meaning of abbreviations and symbols, see introductory text]

Product class and geographic area	1992 value of product shipments	1987 value of product shipments	Product class and geographic area	1992 value of product shipments	1987 value of product shipments
38295, COMMERCIAL, GEOPHYSICAL, METEOROLOGICAL, AND GENERAL-PURPOSE INSTRUMENTS			38295, COMMERCIAL, GEOPHYSICAL, METEOROLOGICAL, AND GENERAL-PURPOSE INSTRUMENTS—Con.		
United States	1 409.5	891.5	New York	159.5	65.8
Arizona	8.2	13.2	Ohio	9.0	16.3
California	174.2	218.5	Oklahoma	21.4	(NA)
Colorado	11.3	5.6	Pennsylvania	38.2	65.2
Connecticut	70.3	38.7	Texas	495.3	125.1
Illinois	27.2	5.4	Washington	7.8	(NA)
Massachusetts	43.7	35.9			
Michigan	19.6	7.9	38296, SURVEY AND DRAFTING INSTRUMENTS AND ASSOCIATED EQUIPMENT		
New Hampshire	4.1	(NA)	United States	243.5	230.2
New Jersey	50.2	80.2	California	60.5	36.3
			Connecticut	5.5	12.7

Note: For qualifications of data, see footnotes on table 6a.

Table 6c. Historical Statistics for Product Classes—Value Shipped by All Producers: 1992 and Earlier Years

[Million dollars. For meaning of abbreviations and symbols, see introductory text]

Product code	Product class	1992	1991 ¹	1990 ¹	1989 ¹	1988 ¹	1987	1982	1977
3812-	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment	34 435.0	34 173.3	35 249.8	33 292.7	35 003.5	34 016.9	(NA)	(NA)
38121	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals	2 551.3	2 724.6	2 735.7	2 651.4	2 617.0	2 267.6	1 418.7	804.6
38122	Search, detection, navigation, and guidance systems and equipment	31 264.0	31 289.0	32 198.2	30 641.3	31 574.8	30 886.3	(NA)	(NA)
38120	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment, n.s.k.	619.7	159.7	315.9	315.5	811.8	863.0	(NA)	(NA)
3821-	Laboratory apparatus and furniture	1 843.9	1 673.0	1 779.4	1 793.8	1 690.9	1 618.8	(NA)	(NA)
38210	Laboratory apparatus and furniture	1 843.9	1 673.0	1 779.4	1 793.8	1 690.9	1 618.8	(NA)	(NA)
3822-	Environmental controls	2 377.2	2 164.2	2 311.7	2 352.6	2 254.8	2 024.6	1 544.5	1 106.4
38220	Automatic controls for monitoring residential and commercial environments and appliance regulating controls	2 377.2	2 164.2	2 311.7	2 352.6	2 254.8	2 024.6	1 544.5	1 106.4
3823-	Process control instruments	5 943.1	5 304.1	5 515.0	5 218.2	4 748.6	4 370.9	3 915.1	2 061.1
38230	Process control instruments	5 943.1	5 304.1	5 515.0	5 218.2	4 748.6	4 370.9	3 915.1	2 061.1
3824-	Fluid meters and counting devices	2 734.7	2 300.1	2 470.2	1 562.8	1 637.3	1 133.1	787.1	634.3
38242	Integrating and totalizing meters for gas and liquids	775.3	733.5	737.0	650.4	671.6	609.0	519.6	344.0
38243	Counting devices	272.0	163.7	203.3	200.1	211.2	219.3	162.0	147.0
38244	Motor vehicle instruments	1 593.4	1 320.4	1 453.2	632.8	686.0	241.2	76.2	123.2
38240	Fluid meters and counting devices, n.s.k.	94.0	82.5	76.7	79.6	68.5	63.6	29.3	20.1
3825-	Instruments to measure electricity	8 066.8	7 803.8	7 943.2	7 623.3	7 682.7	7 612.3	5 575.6	2 566.2
38251	Integrating instruments, electrical	445.2	410.8	392.1	363.2	407.9	399.8	363.2	223.5
38252	Test equipment for testing electrical, radio, and communication circuits, and motors	6 610.0	6 137.8	6 286.0	6 153.8	6 170.0	6 116.8	4 455.2	1 784.9
38253	Other instruments to measure electricity	559.5	629.2	628.5	604.6	631.1	671.0	556.7	429.9
38250	Instruments to measure electricity, n.s.k.	452.1	626.0	636.5	501.8	473.7	424.7	200.5	127.9
3826-	Analytical instruments	5 088.4	4 762.5	4 460.7	4 019.5	3 372.6	3 156.6	(NA)	(NA)
38260	Analytical and scientific instruments, except optical	5 088.4	4 762.5	4 460.7	4 019.5	3 372.6	3 156.6	(NA)	(NA)
3827-	Optical instruments and lenses	2 287.7	2 028.8	2 010.5	1 976.8	2 095.1	1 990.2	(NA)	(NA)
38271	Sighting, tracking, and fire-control equipment, optical-type	786.5	570.5	629.4	641.3	664.7	729.4	505.4	227.3
38274	Optical instruments and lenses, n.e.c.	1 418.8	1 359.6	1 277.4	1 246.5	1 381.7	1 205.9	922.8	390.0
38270	Optical instruments and lenses, n.s.k.	82.3	98.7	103.8	89.1	48.7	54.8	(NA)	(NA)
3829-	Measuring and controlling devices, n.e.c.	4 337.2	4 352.9	3 923.8	3 778.0	3 601.3	3 389.3	(NA)	(NA)
38291	Aircraft engine instruments, except flight	622.6	585.7	504.8	483.0	539.1	510.1	311.0	120.1
38292	Physical properties testing and inspection equipment and kinematic testing and measuring equipment	1 170.6	1 150.1	1 052.5	1 026.2	913.4	906.4	635.2	276.6
38294	Nuclear radiation detection and monitoring instruments	579.6	617.1	652.3	595.5	609.8	645.0	596.4	344.2
38295	Commercial, geophysical, meteorological, and general-purpose instruments	1 409.5	1 425.5	1 153.6	1 101.1	976.2	891.5	(NA)	(NA)
38296	Survey and drafting instruments and associated equipment	243.5	217.1	251.9	259.4	321.2	230.2	(NA)	(NA)
38290	Measuring and controlling devices, n.e.c., n.s.k.	311.3	357.4	308.7	312.7	241.6	206.2	(NA)	(NA)

¹Figures are estimates derived from a representative sample of manufacturing establishments. Standard errors associated with estimates are published in annual survey of manufactures publications for this period.

Table 7. Materials Consumed by Kind: 1992 and 1987

[Includes cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

Material code	Material	1992 delivered cost (million dollars)	1987 delivered cost (million dollars)
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT			
Materials, ingredients, containers, and supplies -----		8 758.8	10 476.5
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	315.5	(1)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	219.3	(1)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	551.9	(1)
367501	Capacitors -----	93.5	(1)
367601	Resistors -----	82.9	(1)
367990	Other components and accessories, n.e.c. -----	948.6	11 897.6
366301	Electronic communication equipment -----	664.4	(2)
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	228.0	208.8
357001	Electronic computing equipment -----	179.0	(2)
364300	Current-carrying wiring devices -----	76.5	83.9
335796	Insulated wire and cable (including magnet wire) -----	91.9	(2)
365150	Loudspeakers, microphones, and tuners (all types) -----	9.6	(2)
362111	Fractional horsepower electric motors (less than 1 hp) -----	31.2	(2)
281995	Silicon, hyperpure -----	1.4	(2)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., except sheets, rods, tubes and shapes -----	12.8	16.0
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	36.7	37.6
Fabricated metal products (except forgings):			
344401	Sheet metal products (except stampings) -----	188.2	125.2
346901	Metal stampings -----	27.0	29.2
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	105.3	94.1
340063	Other fabricated metal products -----	252.2	(2)
346000	Forgings -----	33.0	(2)
330091	Castings (rough and semifinished) -----	145.8	129.8
Shapes and forms (except castings and forgings):			
331002	Steel -----	80.5	185.9
335001	Aluminum and aluminum-base alloy -----	75.8	87.2
335091	Other nonferrous shapes and forms -----	36.7	(2)
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	19.8	16.5
970099	All other materials and components, parts, containers, and supplies -----	2 438.9	5 387.9
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	1 812.1	2 176.8
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE			
Materials, ingredients, containers, and supplies -----		685.1	526.1
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	14.8	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	29.8	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	7.5	(2)
367501	Capacitors -----	1.9	(2)
367601	Resistors -----	1.6	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	8.8	(2)
364300	Current-carrying wiring devices -----	8.8	2.3
360101	Electric transmission, distribution, and control equipment -----	1.6	3.1
357001	Electronic computing equipment -----	4.3	7.2
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	3.6	5.5
382591	Electrical measuring instruments and parts, not listed elsewhere -----	1.7	2.9
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	7.2	5.3
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	9.2	4.7
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	11.8	4.9
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	49.1	11.0
346901	Metal stampings -----	1.3	1.4
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	1.2	1.0
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	5.4	4.4
340080	Other fabricated metal products -----	25.4	(2)
346000	Forgings -----	(D)	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	1.6	(4)
336005	Aluminum and aluminum-base alloy -----	2.6	1.9
336003	Other nonferrous -----	(D)	.5
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	15.6	(2)
335105	Copper and copper-base alloy -----	.8	(2)
335010	Aluminum and aluminum-base alloy -----	3.0	3.7
335099	Other nonferrous shapes and forms -----	2.1	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	8.7	3.3
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	.8	3.4
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	6.9	6.2
970099	All other materials and components, parts, containers, and supplies -----	288.2	⁴ 293.9
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	146.0	159.5

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1992 and 1987—Con.

[Includes cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

Material code	Material	1992 delivered cost (million dollars)	1987 delivered cost (million dollars)
INDUSTRY 3822, ENVIRONMENTAL CONTROLS			
Materials, ingredients, containers, and supplies -----		805.7	667.0
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	30.4	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	8.7	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	41.6	(2)
367501	Capacitors -----	9.0	(2)
367601	Resistors -----	7.6	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	47.5	(2)
364300	Current-carrying wiring devices -----	12.3	6.4
360101	Electric transmission, distribution, and control equipment -----	7.4	6.8
357001	Electronic computing equipment -----	7.2	12.4
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	2.0	5.1
382591	Electrical measuring instruments and parts, not listed elsewhere -----	(5)	2.2
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	8.4	(4)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	19.4	12.2
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	24.2	14.4
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	21.4	5.0
346901	Metal stampings -----	33.5	27.6
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	11.2	2.3
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	38.2	34.8
340080	Other fabricated metal products -----	27.1	(2)
346000	Forgings -----	.1	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	4.7	(4)
336005	Aluminum and aluminum-base alloy -----	34.0	9.1
336003	Other nonferrous -----	5.2	(2)
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	14.8	29.1
335105	Copper and copper-base alloy -----	18.3	23.8
335010	Aluminum and aluminum-base alloy -----	9.5	14.4
335099	Other nonferrous shapes and forms -----	7.2	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	2.3	1.5
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	3.1	1.5
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	7.7	7.5
970099	All other materials and components, parts, containers, and supplies -----	5141.3	4270.1
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	200.5	180.8
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS			
Materials, ingredients, containers, and supplies -----		1 918.5	1 427.5
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	46.9	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	70.5	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	68.9	(2)
367501	Capacitors -----	13.9	(2)
367601	Resistors -----	60.9	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	43.7	(2)
364300	Current-carrying wiring devices -----	15.5	8.6
360101	Electric transmission, distribution, and control equipment -----	14.9	6.3
357001	Electronic computing equipment -----	84.8	54.6
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	24.5	49.9
382591	Electrical measuring instruments and parts, not listed elsewhere -----	66.8	53.6
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	6.0	6.9
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	2.6	(4)
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	26.0	23.0
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	62.0	39.3
346901	Metal stampings -----	22.9	14.2
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	13.4	11.6
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	26.8	17.9
340080	Other fabricated metal products -----	35.9	(2)
346000	Forgings -----	4.1	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	32.6	19.4
336005	Aluminum and aluminum-base alloy -----	19.1	16.4
336003	Other nonferrous -----	5.1	6.0
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	22.4	51.7
335105	Copper and copper-base alloy -----	7.1	13.6
335010	Aluminum and aluminum-base alloy -----	8.6	15.2
335099	Other nonferrous shapes and forms -----	8.6	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	7.5	8.1
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	9.5	19.6
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	10.0	8.2
970099	All other materials and components, parts, containers, and supplies -----	373.7	470.9
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	703.4	512.5

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1992 and 1987—Con.

[Includes cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

Material code	Material	1992 delivered cost (million dollars)	1987 delivered cost (million dollars)
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES			
Materials, ingredients, containers, and supplies -----		1 039.3	346.0
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	42.5	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	19.9	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	79.8	(2)
367501	Capacitors -----	22.6	(2)
367601	Resistors -----	7.3	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	3.9	(2)
364300	Current-carrying wiring devices -----	12.1	(D)
360101	Electric transmission, distribution, and control equipment -----	5.6	(D)
357001	Electronic computing equipment -----	11.4	2.6
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	26.5	10.0
382591	Electrical measuring instruments and parts, not listed elsewhere -----	(D)	12.0
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	7.3	.1
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	46.5	10.1
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	27.7	11.5
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	10.4	1.2
346901	Metal stampings -----	16.5	9.3
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	7.8	1.8
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	17.9	14.7
340080	Other fabricated metal products -----	8.4	(2)
346000	Forgings -----	(D)	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	23.9	(D)
336005	Aluminum and aluminum-base alloy -----	34.4	27.5
336003	Other nonferrous -----	17.4	(D)
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	19.9	4.6
335105	Copper and copper-base alloy -----	1.2	(D)
335010	Aluminum and aluminum-base alloy -----	9.0	1.8
335099	Other nonferrous shapes and forms -----	(D)	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	2.4	2.8
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	.5	(D)
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	9.2	3.1
970099	All other materials and components, parts, containers, and supplies -----	429.5	184.4
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	94.7	48.5
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY			
Materials, ingredients, containers, and supplies -----		2 578.7	2 265.3
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	134.3	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	187.0	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	260.9	(2)
367501	Capacitors -----	58.2	(2)
367601	Resistors -----	45.4	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	124.0	(2)
364300	Current-carrying wiring devices -----	60.1	35.1
360101	Electric transmission, distribution, and control equipment -----	95.3	35.6
357001	Electronic computing equipment -----	49.8	64.0
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	23.5	74.1
382591	Electrical measuring instruments and parts, not listed elsewhere -----	107.8	106.8
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	3.8	5.7
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	23.5	25.0
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	47.0	17.0
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	83.6	58.8
346901	Metal stampings -----	13.6	15.4
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	20.8	20.7
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	26.9	25.9
340080	Other fabricated metal products -----	32.6	(2)
346000	Forgings -----	.2	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	3.9	(4)
336005	Aluminum and aluminum-base alloy -----	8.5	8.7
336003	Other nonferrous -----	.4	(2)
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	17.0	20.3
335105	Copper and copper-base alloy -----	6.8	7.3
335010	Aluminum and aluminum-base alloy -----	16.7	33.6
335099	Other nonferrous shapes and forms -----	3.5	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	18.7	13.5
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	19.8	21.2
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	18.0	13.5
970099	All other materials and components, parts, containers, and supplies -----	408.2	⁴ 947.3
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	659.0	715.8

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1992 and 1987—Con.

[Includes cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

Material code	Material	1992 delivered cost (million dollars)	1987 delivered cost (million dollars)
INDUSTRY 3826, ANALYTICAL INSTRUMENTS			
Materials, ingredients, containers, and supplies -----		1 899.2	1 201.5
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	23.8	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	71.0	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	38.8	(2)
367501	Capacitors -----	7.5	(2)
367601	Resistors -----	9.3	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	50.6	(2)
364300	Current-carrying wiring devices -----	21.7	1.9
360101	Electric transmission, distribution, and control equipment -----	26.2	.6
357001	Electronic computing equipment -----	65.6	18.4
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	18.5	6.8
382591	Electrical measuring instruments and parts, not listed elsewhere -----	75.1	38.1
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	11.5	10.3
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	1.9	1.9
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	43.1	13.1
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	74.3	15.1
346901	Metal stampings -----	6.4	4.1
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	7.3	2.8
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	37.3	9.2
340080	Other fabricated metal products -----	47.9	(2)
346000	Forgings -----	(6)	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	1.6	(4)
336005	Aluminum and aluminum-base alloy -----	3.3	7.1
336003	Other nonferrous -----	1.1	(2)
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	7.9	16.2
335105	Copper and copper-base alloy -----	(7)	(4)
335010	Aluminum and aluminum-base alloy -----	13.2	6.3
335099	Other nonferrous shapes and forms -----	72.4	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	47.0	8.6
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	6.5	1.3
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	19.3	3.7
970099	All other materials and components, parts, containers, and supplies -----	6417.4	4465.1
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	741.7	570.9
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES			
Materials, ingredients, containers, and supplies -----		729.7	589.2
Components for electronic circuitry, except tubes:			
367201	Printed circuit boards -----	12.1	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	6.0	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	12.2	(2)
367501	Capacitors -----	3.9	(2)
367601	Resistors -----	2.9	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	(D)	(2)
364300	Current-carrying wiring devices -----	1.2	1.2
360101	Electric transmission, distribution, and control equipment -----	5.2	(D)
357001	Electronic computing equipment -----	12.0	8.2
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	4.7	(D)
382591	Electrical measuring instruments and parts, not listed elsewhere -----	1.8	4.6
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	.9	(D)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	5.5	(D)
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	5.6	1.9
Fabricated metal products, except forgings:			
344401	Sheet metal products, except stampings -----	11.3	2.8
346901	Metal stampings -----	3.9	2.1
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	.8	.5
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	3.4	2.2
340080	Other fabricated metal products -----	30.0	(2)
346000	Forgings -----	(D)	(2)
Castings (rough and semifinished):			
332001	Iron and steel -----	6.1	.3
336005	Aluminum and aluminum-base alloy -----	12.0	5.1
336003	Other nonferrous -----	1.0	.4
Shapes and forms, except castings, forgings, and fabricated metal products:			
331002	Steel -----	6.1	(D)
335105	Copper and copper-base alloy -----	2.2	.7
335010	Aluminum and aluminum-base alloy -----	7.7	3.1
335099	Other nonferrous shapes and forms -----	2.2	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	88.0	35.1
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	.5	.7
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	7.8	8.8
970099	All other materials and components, parts, containers, and supplies -----	179.4	323.4
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	281.3	188.1

See footnotes at end of table.

Table 7. Materials Consumed by Kind: 1992 and 1987—Con.

[Includes cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendixes. For meaning of abbreviations and symbols, see introductory text]

Material code	Material	1992 delivered cost (million dollars)	1987 delivered cost (million dollars)
	INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.		
	Materials, ingredients, containers, and supplies -----	1 348.7	1 085.2
	Components for electronic circuitry, except tubes:		
367201	Printed circuit boards -----	35.8	(2)
367981	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components) -----	79.6	(2)
367408	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits -----	38.8	(2)
367501	Capacitors -----	10.7	(2)
367601	Resistors -----	8.9	(2)
367990	Other components and accessories, n.e.c., not listed elsewhere -----	38.9	(2)
364300	Current-carrying wiring devices -----	15.8	16.4
360101	Electric transmission, distribution, and control equipment -----	17.6	(2)
357001	Electronic computing equipment -----	51.1	(8)
382501	Electrical instrument mechanisms and meter movements (including instrument relays) -----	27.7	20.0
382591	Electrical measuring instruments and parts, not listed elsewhere -----	12.3	(2)
362119	Fractional horsepower electric motors and generators (less than 1 hp), including timing motors -----	13.4	(2)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc. -----	8.3	6.3
308004	Fabricated plastics products (except gaskets, hoses, and belting) -----	23.4	7.1
	Fabricated metal products, except forgings:		
344401	Sheet metal products, except stampings -----	34.2	20.6
346901	Metal stampings -----	10.1	4.6
349012	Fabricated wire products (including wire rope, cable, springs, etc.) -----	8.5	(2)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	14.3	15.0
340080	Other fabricated metal products -----	63.8	(2)
346000	Forgings -----	1.7	(2)
	Castings (rough and semifinished):		
332001	Iron and steel -----	23.1	15.6
336005	Aluminum and aluminum-base alloy -----	15.8	7.9
336003	Other nonferrous -----	2.8	(2)
	Shapes and forms, except castings, forgings, and fabricated metal products:		
331002	Steel -----	20.2	50.0
335105	Copper and copper-base alloy -----	7.5	9.2
335010	Aluminum and aluminum-base alloy -----	13.3	15.2
335099	Other nonferrous shapes and forms -----	14.7	(2)
320101	Glass and glass products (excluding windows and mirrors) -----	8.8	8.5
260070	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) -----	3.8	(2)
260091	Paper and paperboard containers (including shipping sacks and other paper packaging products) -----	8.5	3.1
970099	All other materials and components, parts, containers, and supplies -----	321.1	497.3
971000	Materials, ingredients, containers, and supplies, n.s.k. ³ -----	394.1	388.4

¹For 1987, materials were not collected separately but were included in code 367990.
²For 1987, materials were not collected separately but were included in code 970099 of the industry in which the material was consumed.
³Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.
⁴For 1987, materials were combined to avoid disclosing data for individual companies.
⁵For 1992, materials are combined to avoid disclosing data for individual companies.
⁶For 1992, materials are combined to avoid disclosing data for individual companies.
⁷For 1992, materials are combined to avoid disclosing data for individual companies.
⁸For 1987, materials were collected differently and were combined with code 970099.

Appendix A.

Explanation of Terms

This appendix is in two sections. Section 1 includes items requested of all establishments mailed census of manufactures forms including annual survey of manufactures (ASM) forms. Note that this section also includes several items (number of establishments and companies, value added, classes of products, and specialization and coverage ratios) not included on the report forms but derived from information collected on the forms. Section 2 covers supplementary items requested only from establishments included in the ASM sample. Results of the supplementary ASM inquiries are included in table 3c of this report.

SECTION 1. ITEMS COLLECTED OR DERIVED BASED ON ALL CENSUS OF MANUFACTURES (INCLUDING ASM) REPORT FORMS

Number of establishments and companies. A separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

If the company operated at different physical locations, even if the individual locations were producing the same line of goods, a separate report was requested for each location. If the company operated in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on any employees, capital expenditures, inventories, or shipments from inventories during the year.

In this report, data are shown for establishments in operation at any time during the year. A comparison with the number of establishments in operation at the end of the year will be provided in the Introduction of the *General Summary* subject report.

Employment and related items. The report forms requested separate information on production workers for a specific payroll period within each quarter of the year and on other employees as of the payroll period which included the 12th of March.

All employees. This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period which included the 12th of the months specified on the report form. Included are all persons on paid sick leave,

paid holidays, and paid vacations during these pay periods. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November.

Production workers. This item includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

All other employees. This item covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver salespersons), sales delivery (highway truckdrivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office function, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment engaged in the construction of major additions or alterations to the plant and utilized as a separate work force.

In addition to reports sent to operating manufacturing establishments, information on employment during the payroll period which included March 12 and annual payrolls also was requested of auxiliary units (e.g., administrative offices, warehouses, and research and development

laboratories) of multiestablishment companies. However, these figures are not included in the totals for individual industries shown in this report. They are included in the *General Summary* and geographic area reports as a separate category.

Payroll. This item includes the gross earnings of all employees on the payrolls of operating manufacturing establishments paid in the calendar year 1992. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers of corporations; it excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payrolls of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all Federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' Social Security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' supplemental labor costs, both those required by Federal and State laws and those incurred voluntarily or as part of collective bargaining agreements. (Supplemental labor costs are explained later in this appendix.)

As in the case of employment figures, the payrolls of separate auxiliary units of multiestablishment companies are not included in the totals for individual industries or industry groups.

Production-worker hours. This item covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave.

Cost of materials. This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (1) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (2) electric energy purchased, (3) fuels consumed for heat, power, or the generation of electricity, (4) work done by

others on materials or parts furnished by manufacturing establishments (contract work), and (5) products bought and resold in the same condition. (See discussion of duplication of data below.)

Specific materials consumed. In addition to the total cost of materials, which every establishment was required to report, information also was collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Information on the establishments consuming less than a specified amount (usually \$25,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which either administrative records or short forms were used was imputed as "not specified by kind." (See Census of Manufactures for the importance of administrative records in the industry.)

Value of shipments. This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of "all other costs" (including company overhead) and profit. (See discussion of duplication of data below.)

Individual products. As in previous censuses, data were collected for most industries on the quantity and value of individual products shipped. In the 1992 census program, information was collected on the output of almost 11,000 individual product items. The term "product," as used in the census of manufactures, represents the finest level of detail for which output information was requested. Consequently, it is not necessarily synonymous with the term "product" as used in the marketing sense. In some cases, it may be much more detailed and, in other cases, it is more aggregative. For example, "pharmaceutical preparations" was distributed into over 100 terms; whereas, "motor gasoline" was reported as a single item.

Approximately 6,300 of the product items were listed separately on the 1992 census report forms. Data for

about 4,500 products were obtained in the monthly, quarterly, or annual surveys comprising the Current Industrial Reports series of the Census Bureau. Totals for the year 1992 for these items, as derived from the commodity surveys, are shown in the "products shipped" table.

The list of products for which separate information was collected was prepared after consultation with industry and government representatives. Comparability with previous figures was given considerable weight in the selection of product categories so that comparable 1987 information is presented for most products.

Typically, both quantity and value of shipments information were collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers also was collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant was collected. Typically, the information on production also was collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

Classes of products. To summarize the product information, the separate products were aggregated into classes of products that, in turn, were grouped into all primary products of each industry. The code structure used is a seven-digit number for the individual product, a five-digit number for the class of product, and a four-digit number for the total primary products in an industry. (See Census of Manufactures, Industry Classification of Establishments, for application of the coding structure to the assignment of SIC codes for establishments.)

In the 1992 census, the 11,000 products were grouped into approximately 1,500 separate classes on the basis of general similarity of manufacturing processes, types of materials used, etc. However, the grouping of products was affected by the economic significance of the class and, in some cases, dissimilar products were grouped because the products were not sufficiently significant to warrant separate classes.

Duplication in cost of materials and value of shipments. The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication since the products of some industries are used as materials by others. This duplication results, in part, from the addition of related industries representing successive stages

in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the food group and the addition of pulp mills to paper mills in the paper and allied products group of industries. Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the annual survey.

Duplication of products within individual industries is significant within a number of industry groups, e.g., machinery and transportation industries. These industries frequently include complete machinery and their parts. In this case, the parts made for original equipment are materials consumed for assembly plants in the same industry.

Even when no significant amount of duplication is involved, value of shipments figures are deficient as measures of the relative economic importance of individual manufacturing industries or geographic areas because of the wide variation in ratio of materials, labor, and other processing costs of value of shipments, both among industries and within the same industry.

Before 1962, cost of materials and value of shipments were not published for some industries which included considerable duplication. Since then, these data have been published for all industries at the U.S. level and beginning in 1964, for all geographic levels.

Value added by manufacture. This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1a), value added is adjusted only for the change in work-in-process inventories between the beginning and end of year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

"Value added" avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

New and used capital expenditures. For establishments in operation and any known plants under construction, manufacturers were asked to report their new expenditures for (1) permanent additions and major alterations to

manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type for which depreciation accounts were ordinarily maintained.

The totals for new expenditures include expenditures leased from nonmanufacturing concerns through capital leases. New facilities owned by the Federal Government but operated under contract by private companies, and plant and equipment furnished to the manufacturer by communities and nonprofit organizations are excluded. Also excluded are expenditures for used plant and equipment (although reported in the census), expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers also were requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred for the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Furthermore, if the establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported under used capital expenditures.

Total expenditures for used plant and equipment is a universe figure; it is collected on all census forms. However, the breakdown of this figure between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. The data for total new capital expenditures, new building expenditures, and new machinery expenditures, as well as the data for total used expenditures, are shown in table 3b.

End-of-year inventories. Respondents were asked to report their 1991 and 1992 end-of-year inventories at cost or market. Effective with the 1982 Economic Census, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

SECTION 2. ITEMS COLLECTED ONLY ON ASM REPORT FORMS

The following items were collected only from establishments included in the ASM sample:

Supplemental labor costs. Supplemental labor costs are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Federal old age and survivors' insurance, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not specifically required by legislation whether they

Because of this change in reporting instructions, the 1982 through 1992 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown in table 1a of this report and in historical census of manufactures and annual survey of manufactures publications.

In using inventory data by stage of fabrication for "all industries" and at the two-digit industry level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by another establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for individual industries, industry groups, and "all manufacturing", which are aggregates of figures reported by establishments in specified industries.

Specialization and coverage ratios. These items are not collected on the report forms but are derived from the data shown in table 5b. An establishment is classified in a particular industry if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

An establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). Specialization and coverage ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in tables 1a through 5a and data on product shipments shown in tables 6a through 6c.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans. They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees.

While the excluded items do benefit employees and all or part of their cost generally is similar to the items covered in the ASM labor costs statistics, accounting records generally do not provide reliable figures on net employee benefits of these types.

Retirements of depreciable assets. Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during 1992. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent also was requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.

Depreciation charges for fixed assets. This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.

Rental payments. Total rental payments is collected on all census forms. However, the breakdown between rental payments for buildings and other structures and rental payments for machinery and equipment is collected only on the ASM forms. This item includes rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.

When an establishment of a multiestablishment company was charged rent by another part of the same company for the use of assets owned by the company, it was instructed to exclude that cost from rental payments. However, the book value (original cost) of these company-owned assets was to be reported as assets of the establishment at the end of the year.

If there were assets at an establishment rented from another company and the rents were paid centrally by the head office of the establishment, the company was instructed to report these rental payments as if they were paid directly by the establishment.

Depreciable assets. Total value of gross depreciable assets is collected on all census forms. However, the detail for depreciable assets is collected only on the ASM forms. The data encompass all fixed depreciable assets on the books of establishments at the beginning and end of the year. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all

buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are nondepreciable capital assets, including inventories and intangible assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year. Accordingly, the value of assets at the end of the year includes the value of construction in progress. In addition, respondents were requested to make certain that assets at the beginning of the year plus new and used capital expenditures, less retirements, equalled assets at the end of the year.

New and used capital expenditures. The data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used capital expenditures are collected on all census forms. However, the breakdown between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. (See further explanation on capital expenditures in section 1.)

Quantity of electric energy consumed for heat and power. Data on the cost of purchased electric energy are collected on all census forms. However, data on the quantity of purchased electric energy are collected only on the ASM forms. In addition, information is collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.

Breakdown of new capital expenditures for machinery and equipment. ASM establishments were requested to separate their capital expenditures for new machinery and equipment into (1) automobiles, trucks, etc., for highway use, (2) computers and peripheral data processing equipment, and (3) all other.

The category "automobiles, trucks, etc., for highway use" is intended to measure expenditures for vehicles designed for highway use that were acquired through a purchase or lease-purchase agreement. Vehicles normally operating off public highways (vehicles specifically designed to transport materials, property, or equipment on mining, construction, logging, and petroleum development projects) are excluded from this item.

Foreign content of cost of materials. Establishments included in the ASM sample panel were requested to provide information on foreign-made materials purchased or transferred from foreign sources. This includes materials acquired from a central warehouse or other domestic establishment of the same company but made in an operation outside of the 50 States, District of Columbia, Puerto Rico, or U.S. territories.

Cost of purchased services. ASM establishments were requested to provide information on the cost of purchased services for the repair of buildings and other structures, the repair of machinery, communication services, legal services, accounting and bookkeeping services, advertising, software and other data processing services, and refuse removal. Each of these items reflect the costs paid directly by the establishment, and exclude salaries paid to employees of the establishment for these services.

Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property also are included. Extensive repairs or reconstruction that were capitalized are considered capital expenditures for used buildings and machinery and are, therefore, excluded from this item. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force also are excluded.

Included in the cost of purchased advertising services are payments for printing, media coverage, and other advertising services and materials.

Included in the cost of purchased software and other data processing services are all purchases by the establishment from other companies. Excluded are services provided by other establishments of the same company (such as by a separate data processing unit).

Included in the cost of purchased refuse removal services are all costs of refuse removal services paid by the establishment, including costs for hazardous waste removal or treatment. Excluded are all costs included in rental payments or as capital expenditures.

Three basic approaches were utilized to produce these statistics.

1. For items 1 through 6, data were estimated (imputed) for all non-ASM establishments using the available data in the establishment record and industry-based parameters. The statistics were then generated by simply tabulating all census records including the imputed value for non-ASM establishments and the unweighted value for ASM establishments. Separate imputation rates were developed and are shown in the table. For quantity of purchased electricity for heat and power (item 7), a similar procedure was used; however, the imputation parameters were geographically-based instead of industry-based. For quantities of generated less sold electricity, no imputation was performed for non-ASM establishments. The estimates for these items are simply tabulations of unweighted ASM values.

Since the published statistics for these items were developed from the complete census universe and not just the ASM establishments, there are no sampling variances associated with these statistics. However, there is an unknown level of bias for each of the items due to the imputation of the non-ASM establishments. This bias is felt to be small due to the strong correlation between the items being imputed and the collected items that were used to generate the impute values.

2. For items 8 and 9, the estimates were developed using a ratio estimation methodology. For item 8, an estimate of the breakout of new capital expenditures for machinery and equipment into the three categories was made from ASM establishments reporting these categories. The estimated proportions were then applied to the corresponding census value for new capital expenditures for machinery and equipment to produce the estimates.

The estimates for item 9, foreign content of cost of materials, were developed in a similar manner based on costs of parts, supplies, and components (item 5a) as the control total for the three categories.

For items 8 and 9, an adjustment ratio of the following form was computed:

$$R_j = \frac{NMc}{TMEasm}$$

where:

NMc = the census value of new capital expenditures for machinery and equipment

TMEasm = the weighted ASM value of new capital expenditures for machinery and equipment from reporters of the detailed breakout data

3. For item 10, cost of purchased services, the estimates were made by simply tabulating weighted data for all the ASM records that reported the item. A response coverage ratio (a measure of the extent to which respondents reported for each item) is shown in table 3c for the types of services. It is derived for each item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight, see appendix B) for those ASM establishments that reported the specific inquiry to the weighted total employment for all ASM establishments classified in the industry.

Appendix B.

Annual Survey of Manufactures Sampling and Estimating Methodologies

DESCRIPTION OF SURVEY SAMPLE

The annual survey of manufactures (ASM) contains two components. The mail portion of the survey is a probability sample of about 64,000 manufacturing establishments selected from a total of about 216,000 establishments. These 216,000 establishments represent all manufacturing establishments of multiunit companies and all single-establishment companies mailed schedules in the 1987 Census of Manufactures. This mail portion is supplemented annually by a Social Security Administration list of new manufacturing establishments opened after 1987 and a list of new multiunit manufacturing establishments identified from the Census Bureau's Company Organization Survey.

For the current panel, all establishments of companies with 1987 shipments in manufacturing in excess of \$500 million were included in the survey panel with certainty. There are approximately 500 such companies collectively accounting for approximately 18,000 establishments. For the remaining portion of the mail survey, the establishment was defined as the sampling unit. For this portion, all establishments with 250 employees or more and establishments with a very large value of shipments also were included in the survey panel with certainty. A total of 12,100 establishments were selected from this portion of the universe with certainty. Therefore, of the 64,000 manufacturing establishments included in the ASM panel, approximately 31,000 are selected with certainty. These certainty establishments collectively account for approximately 80 percent of the total value of shipments in the 1987 census.

Smaller establishments in the remaining portion of the mail survey were sampled with probabilities ranging from 0.999 to 0.005 in accordance with mathematical theory for optimum allocation of a sample. The probabilities of selection assigned to the smaller establishments were proportional to measures of size determined for each establishment. The measures of size depend directly upon each establishment's 1987 product class values and the historic variability of the year-to-year shipments of each product class. Product classes displaying more volatile year-to-year change in shipments at the establishment level were sampled at a heavier rate.

This method of assigning measures of size was used in order to maximize the precision (that is, minimize the variance of estimates of the year-to-year change) in the value of product class shipments. Implicitly, it also gave weight differences in employment, value added, and other

general statistics, since these are highly correlated with value of shipments. Individual sample selection probabilities were obtained by multiplying each establishment's final measure of size by an overall sampling fraction coefficient calculated to yield a total expected sample size.

The sample selection procedure gave each establishment in the sampling frame an independent chance of selection. This method of independent selection permits the rotation of small establishments out of a given sample panel without introducing a bias into the survey estimates.

The nonmail portion of the survey includes all single-establishment companies that were tabulated as administrative records in the 1987 Census of Manufactures. Although this portion contained approximately 134,000 establishments, it accounted for less than 2 percent of the estimate for total value of shipments at the total manufacturing level. This portion was not sampled; rather, the data for every establishment in this group were estimated based on selected information obtained annually from the administrative records of the Internal Revenue Service and the Social Security Administration. This administrative-records information, which includes payroll, total employment, industry classification, and physical location of the establishment, was obtained under conditions which safeguard the confidentiality of both tax and census records. Estimates of data other than payroll and employment for these small establishments were developed from industry averages.

The corresponding estimates for the mail and nonmail establishments were added together, along with the base-year differences, as defined in the Description of Estimating Procedure section, to produce the figures shown in this publication.

DESCRIPTION OF ESTIMATING PROCEDURES

Most of the ASM estimates for the years 1988-1991 were computed using a difference estimation procedure. For each item, a base-year difference was developed. This base-year difference is equal to the difference between the 1987 census published number for an item total and the linear ASM estimate of the total for 1987. The ASM linear estimate was obtained by multiplying each sample establishment's data by its sample weight (the reciprocal of its probability of selection) and summing the weighted values.

These base-year differences were then added to the corresponding current-year linear estimates, which include the sum of the estimates for the mail and nonmail

establishments, to produce the estimates for the years 1983-1991. Estimates developed by this procedure usually are far more reliable than comparable linear estimates developed from the current sample data alone.

However, the 1992 sample estimates for the purchased service items, shown in table 3c, are strictly ASM linear estimates developed only from ASM establishments that reported the specific item.

The remaining estimates in table 3c, showing the breakdown of expenditures for new machinery and equipment and costs of parts (separated into purchases from foreign sources and purchases from domestic sources), were computed as ratio estimates. To do this, linear estimates of the new machinery detail items were developed from the ASM establishments and were ratio adjusted to the corresponding census total for new machinery. In a similar fashion, the ASM linear estimates of the detailed purchased materials items were ratio adjusted to the corresponding census total for cost of parts.

QUALIFICATIONS OF THE DATA

The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sampled lists but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the differences between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of the estimates.

The particular sample selected for the ASM is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretical, comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected statistics in this report. They are presented in the form of relative standard errors (the standard errors divided by the estimated values to which they refer).

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete-coverage value would be included in the range:

1. From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.
2. From two standard errors below to two standard errors above the derived estimate for about 19 of 20 of all possible samples.
3. From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total, about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total and almost certain confidence that the interval 47,000 to 53,000 includes the complete-coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors also would occur if a complete canvass were to be conducted under the same conditions as the survey. Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected in the course of the Census Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or only moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown.

The concept of complete coverage under the conditions prevailing for the ASM is not identical to the complete coverage of the census of manufactures, as the censuses have been conducted. Nearly all types of operational errors that affect the ASM also occur in the censuses. The ASM and the censuses, are conducted under quite different conditions, and operational errors can be better controlled in the ASM than in the censuses. As a result, for many of the census figures, the errors are of the same order of size as the total errors of the corresponding annual survey estimates. The differences between the census and ASM operating conditions also disturb, to some degree, the comparability of the ASM and census data.

Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be of limited reliability. However, the figure may be combined with higher-level totals, creating a broader aggregate, which then may be of acceptable reliability.

Appendix C. Product Code Reference Tables

Part 1. Comparability of Product Classes and Product Codes That Changed: 1992 to 1987

1992	1987	1992	1987	1992	1987	1992	1987
38274	38272	38432 09	38432 04	38611 81	38611 79	38617 29	38617 15
		38432 09	38432 05	38611 81	38611 82	38617 29	38617 24
38274	38273	38432 19	38432 06	38611 97	38611 63	38617 41	38617 49
		38432 19	38432 07	38611 97	38611 64	38617 43	38617 49
		38432 19	38432 08	38611 97	38611 91	38617 45	38617 49
38274 10	38272 00			38611 97	38611 98	38617 47	38617 49
38274 20	38273 00	38511 17	38511 12			38617 51	38617 27
		38511 17	38511 14	38612 00	38612 22	38617 51	38617 49
		38511 17	38511 16	38612 00	38612 24		
38295 00	38295 10			38612 00	38612 25	38618 14	38618 13
38295 00	38295 20			38612 00	38612 27	38618 15	38618 13
		38514 45	38514 41	38612 00		38618 19	38618 13
		38514 45	38514 43				
38411 23	38411 22					38731 04	38731 01
38411 23	38411 24			38613 11	38613 16	38731 04	38731 02
38411 84	38421 03	38517 09	38517 01	38613 11	38613 17	38731 04	38731 02
38411 96	38411 76	38517 09	38517 05	38613 11	38613 74	38731 04	38731 03
38411 96	38411 81	38517 09	38517 07	38613 21	38613 81	38731 14	38731 05
38411 96	38411 97	38517 09	38517 10	38613 21	38613 85	38731 14	38731 06
		38517 19	38517 01	38613 21	38613 89	38731 14	38731 07
38423 73	38423 23	38517 19	38517 05			38731 14	38731 11
38423 73	38423 24	38517 19	38517 07			38731 14	38731 11
38423 73	38423 71	38517 19	38517 11			38731 14	38731 13
				38615 06	38615 05		
				38615 08	38615 05	38732 59	38732 52
38431 04	38431 12	38611 67	38611 66	38615 19	38615 01	38732 59	38732 56
38431 04	38431 13	38611 67	38611 69	38615 19	38615 04	38732 69	38732 66
		38611 81	38611 75	38615 19	38615 05	38732 69	38732 68

Part 2. Comparability of Product Classes and Product Codes That Changed: 1987 to 1992

1987	1992	1987	1992	1987	1992	1987	1992
38272	38274	38432 04	38432 09	38611 69	38611 67	38617 15	38617 29
38272 00	38274 10	38432 05	38432 09	38611 75	38611 81	38617 24	38617 29
		38432 06	38432 19	38611 79	38611 81	38617 27	38617 51
38273	38274	38432 07	38432 19	38611 82	38611 81	38617 49	38617 41
38273 00	38274 20	38432 08	38432 19	38611 91	38611 97	38617 49	38617 43
				38611 98	38611 97	38617 49	38617 45
						38617 49	38617 47
38295 10	38295 00	38511 12	38511 17			38617 49	38617 51
38295 20	38295 00	38511 14	38511 17	38612 22	38612 00		
		38511 16	38511 17	38612 24	38612 00		
				38612 25	38612 00	38618 13	38618 14
38411 22	38411 23	38514 41	38514 45	38612 27	38612 00	38618 13	38618 15
38411 24	38411 23	38514 43	38514 45			38618 13	38618 19
38411 76	38411 96						
38411 81	38411 96	38517 01	38517 09	38613 16	38613 11	38731 01	38731 04
38411 97	38411 96	38517 01	38517 19	38613 17	38613 11	38731 02	38731 04
		38517 05	38517 09	38613 74	38613 11	38731 03	38731 04
		38517 05	38517 19	38613 81	38613 21	38731 05	38731 14
38421 03	38411 84	38517 07	38517 09	38613 85	38613 21	38731 06	38731 14
		38517 07	38517 19	38613 89	38613 21	38731 07	38731 14
38423 23	38423 73	38517 10	38517 09			38731 11	38731 14
38423 24	38423 73	38517 11	38517 19			38731 13	38731 14
38423 71	38423 73			38615 01	38615 19		
				38615 04	38615 19	38732 52	38732 59
				38615 05	38615 06	38732 56	38732 59
38431 12	38431 04	38611 63	38611 97	38615 05	38615 08	38732 66	38732 69
38431 13	38431 04	38611 64	38611 97	38615 05	38615 19	38732 66	38732 69
		38611 66	38611 67	38615 05		38732 68	38732 69

Part 3. Current Industrial Reports by Product Code

[Current Industrial Reports (CIR) data are contained in the publication *Manufacturing Profiles: 1992* [MP-1(92)] issued August 1994 and available through the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. To access the most current CIR data electronically, dial the Census-BEA Electronic Forum at 301-457-2310. Your communications modem should be set as follows: Baud rate: 1200, 2400, 9600; Parity: None; Data bits: 8; Stop bits: 1; Duplex: full. Before making your first call, decide on a password and be prepared to provide the following regarding your computer: PC brand name, monitor screen dimensions (e.g., 80 columns by 24 lines), monitor color support, modem baud rate, and PC communications software package. Call the voice number, 301-457-1242, for further bulletin board assistance]

Product code	Current Industrial Report	Product code	Current Industrial Report
3812100	MA38B, Selected Instruments and Related Products	3812100	MA38B, Selected Instruments and Related Products
3812200	MA38B, Selected Instruments and Related Products	3812200	MA38B, Selected Instruments and Related Products
3821010	MA38B, Selected Instruments and Related Products	3821010	MA38B, Selected Instruments and Related Products
3821020	MA38B, Selected Instruments and Related Products	3821020	MA38B, Selected Instruments and Related Products
3822000	MA38B, Selected Instruments and Related Products	3822000	MA38B, Selected Instruments and Related Products
3823000	MA38B, Selected Instruments and Related Products	3823000	MA38B, Selected Instruments and Related Products
3824200	MA38B, Selected Instruments and Related Products	3824200	MA38B, Selected Instruments and Related Products
3824300	MA38B, Selected Instruments and Related Products	3824300	MA38B, Selected Instruments and Related Products
3824400	MA38B, Selected Instruments and Related Products	3824400	MA38B, Selected Instruments and Related Products
3825100	MA38B, Selected Instruments and Related Products	3825100	MA38B, Selected Instruments and Related Products
3825200	MA38B, Selected Instruments and Related Products	3825200	MA38B, Selected Instruments and Related Products
3825300	MA38B, Selected Instruments and Related Products	3825300	MA38B, Selected Instruments and Related Products
3826000	MA38B, Selected Instruments and Related Products	3826000	MA38B, Selected Instruments and Related Products
3827100	MA38B, Selected Instruments and Related Products	3827100	MA38B, Selected Instruments and Related Products
3827410	MA38B, Selected Instruments and Related Products	3827410	MA38B, Selected Instruments and Related Products
3827420	MA38B, Selected Instruments and Related Products	3827420	MA38B, Selected Instruments and Related Products
3829100	MA38B, Selected Instruments and Related Products	3829100	MA38B, Selected Instruments and Related Products
3829200	MA38B, Selected Instruments and Related Products	3829200	MA38B, Selected Instruments and Related Products
3829400	MA38B, Selected Instruments and Related Products	3829400	MA38B, Selected Instruments and Related Products
3829500	MA38B, Selected Instruments and Related Products	3829500	MA38B, Selected Instruments and Related Products
3829600	MA38B, Selected Instruments and Related Products	3829600	MA38B, Selected Instruments and Related Products
3844000	MA36R, Electromedical and Irradiation Equipment	3844000	MA36R, Electromedical and Irradiation Equipment
3845000	MA36R, Electromedical and Irradiation Equipment	3845000	MA36R, Electromedical and Irradiation Equipment

Publication Program

1992 CENSUS OF MANUFACTURES

Publications of the 1992 Census of Manufactures, containing preliminary and final data on manufacturing establishments in the United States, are described below. Publications order forms for the specific reports may be obtained from any Department of Commerce district office or from Data User Services Division, Customer Services, Bureau of the Census, Washington, DC 20233-8300.

Preliminary Reports

Industry series—83 reports (MC92-I-20A(P) to -39D(P))

Preliminary industry data are issued in 83 separate reports covering 459 industries. Preliminary summary data for the United States and States are released in one report.

Final Reports

Industry series—83 reports (MC92-1-20A to -39D)

Each of the 83 reports provides information for a group of related industries ("dairy products" includes industries for butter, cheese, milk, etc.). Final figures for the United States are shown for each of the 459 manufacturing industries on quantity and value of products shipped and materials consumed, cost of fuels and electric energy, capital expenditures, assets, rents, inventories, employment, payroll, payroll supplements, hours worked, value added by manufacture, number of establishments, and number of companies. Comparative statistics for earlier years are provided where available.

For each industry, data on value of shipments, value added by manufacture, capital expenditures, employment, and payroll are shown by employment-size class of establishment, State, and degree of primary product specialization.

Geographic area series—51 reports (MC92-A-1 to -51)

A separate report is being published for each State and the District of Columbia. Each report presents data for industry groups and industries on value of shipments, cost of materials, value added by manufacture, employment, payroll, hours worked, new capital expenditures, and number of manufacturing establishments for the State, MA's, counties, and selected places. Comparative statistics for earlier census years are shown for the State and large MA's. Manufacturing totals are presented for each county and for places with significant manufacturing activity. Detailed statistics (including inventories, assets, rents, and energy costs) are presented only in statewide totals.

Subject series—3 reports (MC92-S-1 to -3)

Each of the three reports contains detailed statistics for an individual subject, such as concentration ratios in manufacturing, manufacturers' shipments to the Federal Government, and a general national-level summary.

Reference series—1 report (MC92-R-1)

The *Numerical List of Manufactured and Mineral Products* includes a description of the principal products and services published in the 1992 Censuses of Manufactures and Mineral Industries.

Location of Manufacturing Plants—1 report (MC92-LM)

This report includes data for number of establishments by four-digit SIC industry and by employment-size class for counties, incorporated places of 2,500 inhabitants or more, and Zip Codes for each State. This report is available only on compact disc-read only memory (CD-ROM).

Analytical Reports—2 reports (AR92-1 and -2)

Exports From Manufacturing Establishments (AR92-1)

This report presents data on exports by two- and three-digit SIC industry groups for the United States and States. Information is presented on value of direct report shipments and estimates of the employment required to manufacture these products. Included are estimates of employment in manufacturing and nonmanufacturing establishments that supply parts, materials, and services for production of manufactured exports.

Selected Characteristics of Manufacturing Establishments That Export (AR92-2)

This report presents data on the number of manufacturing companies and establishments that export by major group, State, employment size, and ratios of exports to shipments.

Electronic Media

All data included in the printed reports are available on CD-ROM. The CD-ROM's provide the same information found in the reports as well as additional information not published in the final reports, such as location of manufacturing plants. Electronic media products are available for users who wish to summarize, rearrange, or process large amounts of data. These products, with corresponding technical documentation, are sold by Data User Services Division, Customer Services, Bureau of the Census, Washington, DC 20233-8300.

OTHER ECONOMIC CENSUSES REPORTS

Data on retail trade, wholesale trade, financial, insurance, real estate, service industries, construction industries, mineral industries, transportation, communications, utilities, enterprise statistics, minority-owned businesses, and women-owned businesses also are available from the 1992 Economic Census. A separate series of reports covers the census of outlying areas—Puerto Rico, Virgin Islands of the United States, Guam, and the Commonwealth of the Northern Mariana Islands. Separate announcements describing these reports are available free of charge from Data User Services Division, Customer Services, Bureau of the Census, Washington, DC 20233-8300.