

Bare Printed Circuit Board Manufacturing

1997

Issued August 1999

EC97M-3344B

1997 Economic Census

Manufacturing

Industry Series



U S C E N S U S B U R E A U

Helping You Make Informed Decisions

U.S. Department of Commerce
Economics and Statistics Administration
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-- Not applicable for this report.

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

- Policymaking agencies of the Federal Government use the data to monitor economic activity and assess the effectiveness of policies.
- 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, which allows them to 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.

ALL-NEW INDUSTRY CLASSIFICATIONS

Data from the 1997 Economic Census are published primarily on the basis of the North American Industry Classification System (NAICS), unlike earlier censuses, which were published according to the Standard Industrial Classification (SIC) system. NAICS is in the process of being adopted in the United States, Canada, and Mexico. Most economic census reports cover one of the following NAICS sectors:

21	Mining
22	Utilities
23	Construction
31-33	Manufacturing
42	Wholesale Trade
44-45	Retail Trade
48-49	Transportation and Warehousing
51	Information

52	Finance and Insurance
53	Real Estate and Rental and Leasing
54	Professional, Scientific, and Technical Services
55	Management of Companies and Enterprises
56	Administrative and Support and Waste Management and Remediation Services
61	Educational Services
62	Health Care and Social Assistance
71	Arts, Entertainment, and Recreation
72	Accommodation and Foodservices
81	Other Services (except Public Administration)

(Not listed above are the Agriculture, Forestry, Fishing, and Hunting sector (NAICS 11), partially covered by the census of agriculture conducted by the U.S. Department of Agriculture, and the Public Administration sector (NAICS 92), covered by the census of governments conducted by the Census Bureau.)

The 20 NAICS sectors are subdivided into 96 subsectors (three-digit codes), 313 industry groups (four-digit codes), and, as implemented in the United States, 1170 industries (five- and six-digit codes).

RELATIONSHIP TO SIC

While many of the individual NAICS industries correspond directly to industries as defined under the SIC system, most of the higher level groupings do not. Particular care should be taken in comparing data for retail trade, wholesale trade, and manufacturing, which are sector titles used in both NAICS and SIC, but cover somewhat different groups of industries. The industry definitions discuss the relationships between NAICS and SIC industries. Where changes are significant, it will not be possible to construct time series that include data for points both before and after 1997.

For 1997, data for auxiliary establishments (those functioning primarily to manage, service, or support the activities of their company's operating establishments, such as a central administrative office or warehouse) will not be included in the sector-specific reports. These data will be published separately.

GEOGRAPHIC AREA CODING

Accurate and complete information on the physical location of each establishment is required to tabulate the census data for the states, metropolitan areas (MAs), counties, parishes, and corporate municipalities including cities, towns, villages, and boroughs. Respondents were

required to report their physical location (street address, municipality, county, and state) if it differed from their mailing address. For establishments not surveyed by mail (and those single-establishment companies that did not provide acceptable information on physical location), location information from Internal Revenue Service tax forms is used as a basis for coding.

BASIS OF REPORTING

The economic census is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each store, factory, shop, or other location. Each establishment is assigned a separate industry classification based on its primary activity and not that of its parent company.

DOLLAR VALUES

All dollar values presented are expressed in current dollars; i.e., 1997 data are expressed in 1997 dollars, and 1992 data, in 1992 dollars. Consequently, when making comparisons with prior years, users of the data should consider the changes in prices that have occurred.

All dollar values are shown in thousands of dollars.

AVAILABILITY OF ADDITIONAL DATA

Reports in Print and Electronic Media

All results of the 1997 Economic Census are available on the Census Bureau Internet site (www.census.gov) and on compact discs (CD-ROM) for sale by the Census Bureau. Unlike previous censuses, only selected highlights are published in printed reports. For more information, including a description of electronic and printed reports being issued, see the Internet site, or write to U.S. Census Bureau, Washington, DC 20233-8300, or call Customer Services at 301-457-4100.

Special Tabulations

Special tabulations of data collected in the 1997 Economic Census may be obtained, depending on availability of time and personnel, in electronic or tabular form. The data will be summaries 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) that govern 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 of the division named below, U.S. Census Bureau, Washington, DC 20233-8300. To discuss a special tabulation before submitting specifications, call the appropriate division:

Manufacturing and Construction Division 301-457-4673
Service Sector Statistics Division 301-457-2668

HISTORICAL INFORMATION

The economic census has been taken as an integrated program at 5-year intervals since 1967 and before that for 1954, 1958, and 1963. Prior to that time, individual components 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 the 1840 Decennial Census and subsequent censuses to include mining and some commercial activities. The 1905 Manufactures Census was the first time a census was taken apart from the regular decennial population census. Censuses covering retail and wholesale trade and construction industries were added in 1930, as were some covering service trades in 1933. Censuses of construction, manufacturing, and the other business service censuses were suspended during World War II.

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 range of industries covered in the economic censuses expanded between 1967 and 1992. The census of construction industries began on a regular basis in 1967, and the scope of service industries, introduced in 1933, was broadened in 1967, 1977, and 1987. While a few transportation industries were covered as early as 1963, it was not until 1992 that the census broadened to include all of transportation, communications, and utilities. Also new for 1992 was coverage of financial, insurance, and real estate industries. With these additions, the economic census and the separate census of governments and census of agriculture collectively covered roughly 98 percent of all economic activity.

Printed statistical reports from the 1992 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 reports printed since 1967 are still available for sale on microfiche from the Census Bureau. CD-ROMs issued from the 1987 and 1992 Economic Censuses contain databases including nearly all data published in print, plus additional statistics, such as ZIP Code statistics, published only on CD-ROM.

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 1997 Economic Census and Related Statistics* at www.census.gov/econguide. More information on the methodology, procedures, and history of the censuses will be published in the *History of the 1997 Economic Census* at www.census.gov/econ/www/history.html.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used with the 1997 Economic Census data:

A	Standard error of 100 percent or more.
D	Withheld to avoid disclosing data of individual companies; data are included in higher level totals.
F	Exceeds 100 percent because data include establishments with payroll exceeding revenue.
N	Not available or not comparable.
Q	Revenue not collected at this level of detail for multiestablishment firms.
S	Withheld because estimates did not meet publication standards.

V	Represents less than 50 vehicles or .05 percent.
X	Not applicable.
Y	Disclosure withheld because of insufficient coverage of merchandise lines.
Z	Less than half the unit shown.
a	0 to 19 employees.
b	20 to 99 employees.
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.
p	10 to 19 percent estimated.
q	20 to 29 percent estimated.
r	Revised.
s	Sampling error exceeds 40 percent.
nec	Not elsewhere classified.
nsk	Not specified by kind.
–	Represents zero (page image/print only).
(CC)	Consolidated city.
(IC)	Independent city.

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Manufacturing

SCOPE

The 1997 Economic Census – Manufacturing covers all manufacturing establishments with one or more paid employees. Manufacturing is defined as the mechanical, physical, or chemical transformation of materials or substances into new products. The assembly of components into new products is also considered manufacturing, except when it is appropriately classified as construction.

Establishments in the manufacturing sector are often described as plants, factories, or mills and typically use power-driven machines and materials-handling equipment. Also included in the manufacturing sector are some establishments that make products by hand, like custom tailors and the makers of custom draperies. While manufacturers typically do not sell to the public, some establishments like bakeries and candy stores that make products on the premises may be included.

GENERAL

This report, from the 1997 Economic Census – Manufacturing, is one of a series of 480 industry reports and 51 geographic area reports, each of which provides statistics for individual industries or states, respectively. Seven of the industry reports are for industries no longer in the manufacturing sector but are included with manufacturing for the 1997 census year. Also included for this sector are General, Product, and Materials Consumed Summary reports, a special report on Concentration Ratios in Manufacturing, and data files on Location of Manufacturing Plants.

Each industry report presents data for a six-digit North American Industry Classification System (NAICS) industry. A description of the particular NAICS industry may be found in Appendix B. These reports include such statistics as number of establishments, employment, payroll, value added by manufacture, cost of materials consumed, value of shipments, capital expenditures, etc. Explanations of these and other terms may be found in Appendix A. The industry reports also include data for states with 100 employees or more in the industry.

State reports, which include the District of Columbia, present similar statistics at the “all manufacturing” level for each state and its metropolitan areas (MAs) with 250 employees or more, and for counties, consolidated cities, and places with 500 employees or more. The state reports also include six-digit NAICS level data for industries with 100 employees or more in the state.

The General Summary report contains industry and geographic area statistics summarized in one report. It includes higher levels of aggregation than the industry and state reports, as well as revisions to the data made after the release of the industry and state reports.

The Products and Materials Consumed reports summarize the products and materials data published in the industry reports. The Product Summary report also includes data from the Current Industrial Reports (CIR) and a special table with data for products that are primary to more than one industry, which are not in the industry reports.

The Concentration Ratios report publishes data on the percentage of value of shipments accounted for by the 4-, 8-, 20-, and 50-largest companies for each manufacturing industry. Also shown in this report are Hirschmann-Herfindahl Indexes for each industry.

The Location of Manufacturing data files contain statistics on the number of establishments for the three- and six-digit NAICS industry by state, county, place, and ZIP Code by employment-size of the establishment.

GEOGRAPHIC AREAS COVERED

Statistics at the six-digit NAICS industry level are shown for states and the District of Columbia in both the state and industry reports for cells with 100 employees or more.

The state reports also include data at the “all manufacturing” level for a variety of geographies that meet the employment criteria.

Data are available for the metropolitan areas (MAs) with 250 employees or more. The term MA is a general term used to encompass all of the specifically defined metropolitan areas. A consolidated metropolitan statistical area (CMSA) is made up of two or more contiguous primary metropolitan statistical areas (PMSAs) with a combined population of at least 1 million. A PMSA is a subdivision of a CMSA that demonstrates very strong internal economic and social links separate from the ties to other portions of the CMSA. A metropolitan statistical area (MSA) is an integrated economic and social unit with a population of at least 50,000. An MA is made up of one or more counties meeting standards of metropolitan character. In New England, cities and towns, rather than counties, are the component geographic units. Determination of the MAs was made by the Office of Management and Budget (OMB) as of June 30, 1997. The population estimates were from the 1990 Census of Population or a subsequent special

census. When applicable, the make-up of an MA is included in Appendix E. Changes to geographical boundaries are noted in Appendix D.

The state reports include data for counties with 500 employees or more. These are the primary divisions of states, except in Louisiana where they are called parishes and in Alaska where they are called boroughs and census areas. Maryland, Missouri, Nevada, and Virginia have one or more places that are independent of county organizations. These places are treated as counties and places. The counties and places are defined as of January 1, 1997.

The state reports include data for places with 500 employees or more. Places are typically cities, towns, and villages. They may be incorporated municipalities, semi-independent municipalities, special economic urban areas (SEUAs), or other place equivalents.

The state reports also include data for consolidated cities with 500 employees or more. Consolidated cities are made up of separately incorporated municipalities.

COMPARABILITY OF THE 1992 AND 1997 CENSUSES

The adoption of the North American Industry Classification System (NAICS) has had a major impact on the comparability of data between the 1992 and 1997 censuses. Approximately half of the industries in the manufacturing sector of NAICS do not have comparable industries in the Standard Industrial Classification (SIC) system that was used in the past. If industries are not comparable between the two censuses, historic data are not shown. When applicable, Appendix G shows the product class and product comparability between the two systems.

While most of the change affecting the manufacturing sector was change within the sector, some industries left manufacturing and others came into manufacturing. Prominent among those leaving manufacturing are logging and portions of publishing. Prominent among the industries coming into the manufacturing sector are bakeries, candy stores where candy is made on the premises, custom tailors, makers of custom draperies, and tire retreading. Data for the industries coming into manufacturing as well as those leaving manufacturing are included in the manufacturing industry report series for 1997. However, the state and summary reports only include data for industries in the NAICS definition of manufacturing.

Another change resulting from the conversion to NAICS is that data for central administrative offices (CAOs) associated with manufacturing are not included along side the

manufacturing data. This change affects data in the state reports and the general summary.

DISCLOSURE

In accordance with Federal law governing census reports (Title 13 of the United States Code), no data are published that would disclose the operations of an individual establishment or company. However, the number of establishments classified in a specific industry or geography is not considered a disclosure, and may be released even when other information is withheld.

The disclosure analysis for the industry statistics files 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 capital expenditures. However, the suppressed data are included in higher-level totals. A separate disclosure analysis is performed for capital expenditures that can be suppressed even though value of shipments data are published.

AVAILABILITY OF MORE FREQUENT ECONOMIC DATA

The Census Bureau conducts the Annual Survey of Manufactures (ASM) in each of the 4 years between the economic censuses. The ASM is a probability-based sample of approximately 58,000 establishments and collects many of the same industry statistics (including employment, payroll, value of shipments, etc.) as the economic census. However, there are selected statistics not included in the ASM. Among these are the number of companies and establishments, detailed product and materials data, and substate geographic data.

In addition to the ASM, the Census Bureau conducts a Current Industrial Reports (CIR) program. The CIR publishes detailed product statistics for selected manufacturing industries at the U.S. level annually and, in some cases, monthly and/or quarterly. For the 1997 Economic Census – Manufacturing, the annual CIR data are included in the Product Summary report.

The Census Bureau also conducts the monthly Manufacturers' Shipments, Inventories, and Orders (M3) program, which publishes detailed statistics for manufacturing industries at the U.S. level.

Table 1. Industry Statistics on NAICS Basis With Distribution Among 1987 SIC-Based Industries: 1997

[NAICS codes appear in bold type. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

NAICS or SIC code	Industry	Com-panies ¹	All estab-lish-ments ²	All employees		Production workers			Value added by manufac-ture (\$1,000)	Cost of materials (\$1,000)	Value of ship-ments (\$1,000)	Total capital ex-pen-di-tures (\$1,000)
				Number	Payroll (\$1,000)	Number	Hours (1,000)	Wages (\$1,000)				
334412 367200	Bare printed circuit board mfg . Printed circuit boards	1 315 N	1 389 1 389	75 091 75 091	2 274 117 2 274 117	56 755 56 755	114 648 114 648	1 366 696 1 366 696	5 789 119 5 789 119	3 827 699 3 827 699	9 595 775 9 595 775	690 768 690 768

¹For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

²Includes establishments with payroll at any time during the year.

Table 2. Industry Statistics for Selected States: 1997

[States that are disclosures or with less than 100 employees are not shown. For explanation of terms, see appendixes. For meaning of abbreviations and symbols, see introductory text]

Industry and geographic area	E ¹	All establishments		All employees		Production workers			Value added by manufac-ture (\$1,000)	Cost of materials (\$1,000)	Value of ship-ments (\$1,000)	Total capital ex-pen-di-tures (\$1,000)
		Total	With 20 em-ploy-ees or more	Number	Payroll (\$1,000)	Number	Hours (1,000)	Wages (\$1,000)				
334412, BARE PRINTED CIRCUIT BOARD MFG												
United States	1	1 389	588	75 091	2 274 117	56 755	114 648	1 366 696	5 789 119	3 827 699	9 595 775	690 768
Alabama	-	14	6	930	19 306	850	1 438	12 644	32 150	49 423	82 026	4 576
Arizona	-	39	19	3 301	91 885	2 581	5 373	60 923	309 169	178 252	480 239	44 338
California	-	387	170	21 748	732 659	15 829	32 393	402 208	2 079 297	1 355 404	3 456 509	286 451
Colorado	1	38	11	1 481	42 827	1 173	2 473	26 961	92 079	68 325	160 031	9 785
Connecticut	-	31	11	1 552	53 896	1 206	2 443	30 663	138 602	89 700	224 900	16 929
Florida	-	65	27	3 555	84 958	2 745	5 652	53 208	234 762	186 183	407 467	15 783
Georgia	2	21	10	1 392	36 541	1 110	2 008	21 497	77 572	24 416	103 046	5 060
Illinois	2	86	52	4 971	133 163	3 771	7 816	84 898	280 842	209 438	488 254	29 636
Iowa	1	5	3	243	5 350	206	358	3 126	13 817	6 398	20 214	2 038
Kansas	3	6	1	172	3 739	131	246	2 028	4 131	7 716	11 701	819
Maryland	6	14	8	405	10 092	313	622	6 614	18 816	11 812	30 576	1 875
Massachusetts	1	63	29	3 323	114 478	2 239	4 721	57 426	269 075	158 724	421 914	20 901
Michigan	1	35	9	1 099	24 957	925	2 052	16 463	62 468	58 195	118 443	7 172
Minnesota	1	62	36	5 930	167 823	4 599	8 717	106 378	345 751	234 493	576 787	52 915
Nevada	1	7	3	258	7 644	221	416	5 256	14 625	18 224	33 012	1 642
New Hampshire	-	35	18	2 520	82 894	1 772	3 602	46 153	240 137	175 379	415 138	27 397
New Jersey	2	37	12	804	21 601	580	1 015	11 254	42 099	40 265	82 035	5 185
New York	-	65	20	4 108	120 630	3 025	6 207	69 009	363 704	215 374	572 075	33 186
Ohio	1	36	17	1 199	31 043	960	1 843	19 936	65 499	39 217	104 915	12 107
Oregon	-	28	10	2 518	74 494	2 036	4 363	51 117	138 502	116 242	253 006	27 936
Pennsylvania	2	40	12	892	23 551	667	1 216	12 481	48 233	26 923	73 628	4 048
Tennessee	-	6	2	253	6 383	213	411	4 300	11 025	19 603	29 962	788
Texas	1	89	37	2 822	84 965	2 201	4 400	61 577	119 175	134 080	253 448	14 502
Utah	2	21	8	1 354	33 985	986	1 772	19 897	71 488	63 415	135 233	9 324
Virginia	-	12	6	2 861	117 226	2 295	4 538	90 255	340 751	115 288	461 973	21 142
Washington	1	25	12	1 640	48 990	1 322	2 929	34 167	117 263	63 555	182 167	6 261
Wisconsin	1	19	7	599	21 037	433	924	9 816	32 099	19 992	52 048	2 394

* Hawaii has no incorporated places in the sense of functioning governmental units; however, in agreement with Hawaiian law, the Bureau of the Census reports data for census designated places (CDPs) which have been designated as place equivalents. Those CDPs, only for the state of Hawaii, with 2,500 or more population are recognized.

¹Some payroll and sales data for 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 statistics 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 where estimated data based on administrative-record data account for 10 percent or more of the figures shown: 1-10 to 19 percent; 2-20 to 29 percent; 3-30 to 39 percent; 4-40 to 49 percent; 5-50 to 59 percent; 6-60 to 69 percent; 7-70 to 79 percent; 8-80 to 89 percent; 9-90 percent or more.

Table 3. Detailed Statistics by Industry: 1997

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

Item	Value	Item	Value
334412, BARE PRINTED CIRCUIT BOARD MFG		334412, BARE PRINTED CIRCUIT BOARD MFG— Con.	
Companies ¹	number.. 1 315	Value added	\$1,000.. 5 789 119
All establishments	number.. 1 389	Total inventories, beginning of year	\$1,000.. 703 892
Establishments with 1 to 19 employees	number.. 801	Finished goods inventories, beginning of year	\$1,000.. 131 711
Establishments with 20 to 99 employees	number.. 412	Work-in-process inventories, beginning of year	\$1,000.. 298 961
Establishments with 100 employees or more	number.. 176	Materials and supplies inventories, beginning of year	\$1,000.. 273 220
All employees	number.. 75 091	Total inventories, end of year	\$1,000.. 755 283
Total compensation ²	\$1,000.. 2 735 373	Finished goods inventories, end of year	\$1,000.. 146 872
Annual payroll	\$1,000.. 2 274 117	Work-in-process inventories, end of year	\$1,000.. 304 843
Total fringe benefits	\$1,000.. 461 256	Materials and supplies inventories, end of year	\$1,000.. 303 568
Production workers, average for year	number.. 56 755	Gross book value of total assets at beginning of year	\$1,000.. 3 449 133
Production workers on March 15	number.. 55 755	Total capital expenditures (new and used)	\$1,000.. 690 768
Production workers on May 15	number.. 56 041	Capital expenditures for buildings and other structures (new and used)	\$1,000.. 132 731
Production workers on August 15	number.. 57 112	Capital expenditures for machinery and equipment (new and used)	\$1,000.. 558 037
Production workers on November 15	number.. 58 112	Total retirements ²	\$1,000.. 194 533
Production-worker hours	\$1,000.. 114 648	Gross book value of total assets at end of year	\$1,000.. 3 945 368
Production-worker wages	\$1,000.. 1 366 696	Total depreciation during year ²	\$1,000.. 365 169
Total cost of materials	\$1,000.. 3 827 699	Total rental payments ²	\$1,000.. 130 384
Cost of materials, parts, containers, etc., consumed	\$1,000.. 3 244 098	Buildings and other structures rental payments ²	\$1,000.. 74 093
Cost of resales	\$1,000.. 288 684	Machinery and equipment rental payments ²	\$1,000.. 56 291
Cost of fuels	\$1,000.. 22 578	Cost of purchased services for the repair of buildings and other structures ³	\$1,000.. 17 502
Cost of purchased electricity	\$1,000.. 128 095	Response coverage ratio ⁴	percent.. 63
Cost of contract work	\$1,000.. 144 244	Cost of purchased services for the repair of machinery and equipment ³	\$1,000.. 71 195
Quantity of electricity purchased for heat and power	1,000 kWh.. 1 905 932	Response coverage ratio ⁴	percent.. 63
Quantity of electricity generated less sold for heat and power	1,000 kWh.. -	Cost of purchased communications services ³	\$1,000.. 19 531
Total value of shipments	\$1,000.. 9 595 775	Response coverage ratio ⁴	percent.. 63
Primary products value of shipments	\$1,000.. 8 910 026	Cost of purchased legal services ³	\$1,000.. 8 113
Secondary products value of shipments	\$1,000.. 180 926	Response coverage ratio ⁴	percent.. 63
Total miscellaneous receipts	\$1,000.. 504 823	Cost of purchased accounting and bookkeeping services ³	\$1,000.. 6 918
Value of resales	\$1,000.. 326 425	Response coverage ratio ⁴	percent.. 63
Contract receipts	\$1,000.. 142 632	Cost of purchased advertising services ³	\$1,000.. 15 076
Other miscellaneous receipts	\$1,000.. 35 766	Response coverage ratio ⁴	percent.. 63
Primary products specialization ratio	percent.. 98	Cost of purchased software and other data processing services ³	\$1,000.. 6 244
Value of primary products shipments made in all industries	\$1,000.. 9 584 100	Response coverage ratio ⁴	percent.. 63
Value of primary products shipments made in this industry	\$1,000.. 8 910 026	Cost of purchased refuse removal (including hazardous waste) services ³	\$1,000.. 22 056
Value of primary products shipments made in other industries	\$1,000.. 674 074	Response coverage ratio ⁴	percent.. 63
Coverage ratio	percent.. 92		

¹For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

²These items are collected in the ASM and estimated for the remaining establishments; therefore, the levels of estimation are higher than for other items in the table.

³Based on ASM sample data.

⁴A response coverage ratio is derived for this item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight) for those ASM establishments that reported to the weighted total employment for all ASM establishments classified in this industry.

Note: The amounts shown for purchased services reflect only those services that establishments purchase from other companies.

Table 4. Industry Statistics by Employment Size: 1997

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

Employment size class	E ¹	All establishments		All employees		Production workers			Value added by manufacture (\$1,000)	Cost of materials (\$1,000)	Value of shipments (\$1,000)	Total capital expenditures (\$1,000)
		Total	With 20 employees or more	Number	Payroll (\$1,000)	Number	Hours (1,000)	Wages (\$1,000)				
334412, BARE PRINTED CIRCUIT BOARD MFG												
All establishments	1	1 389	588	75 091	2 274 117	56 755	114 648	1 366 696	5 789 119	3 827 699	9 595 775	690 768
Establishments with 1 to 4 employees	7	374	—	770	19 545	591	1 031	12 323	49 294	38 758	88 526	3 952
Establishments with 5 to 9 employees	8	204	—	1 373	35 712	1 001	1 780	21 780	76 493	54 790	132 314	6 630
Establishments with 10 to 19 employees	7	223	—	3 029	79 108	2 267	3 913	45 851	159 419	113 080	273 867	18 693
Establishments with 20 to 49 employees	3	268	268	8 625	244 856	6 518	12 459	142 452	485 968	307 351	796 836	36 607
Establishments with 50 to 99 employees	1	144	144	10 483	320 027	7 923	16 386	184 440	681 062	427 172	1 104 805	61 451
Establishments with 100 to 249 employees	—	114	114	17 776	523 075	14 064	28 736	331 057	1 261 701	916 452	2 172 632	140 090
Establishments with 250 to 499 employees	—	42	42	15 062	447 892	12 153	25 076	306 625	1 041 187	868 333	1 891 683	159 828
Establishments with 500 to 999 employees	—	16	16	11 143	286 926	8 099	16 530	184 240	854 773	558 489	1 386 177	147 171
Establishments with 1,000 to 2,499 employees	—	4	4	6 830	316 976	4 139	8 737	137 928	1 179 222	543 274	1 748 935	116 346
Establishments with 2,500 employees or more	—	—	—	—	—	—	—	—	—	—	—	—
Administrative records ²	9	633	—	3 756	85 019	2 791	4 558	53 393	164 073	131 777	298 533	17 004

¹Some payroll and sales data for 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 statistics 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 where estimated data based on administrative-record data account for 10 percent or more of the figures shown: 1–10 to 19 percent; 2–20 to 29 percent; 3–30 to 39 percent; 4–40 to 49 percent; 5–50 to 59 percent; 6–60 to 69 percent; 7–70 to 79 percent; 8–80 to 89 percent; 9–90 percent or more.

²Some payroll and sales data for 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 statistics for these small establishments. Data are also included in respective size classes shown.

Table 5. Industry Statistics by Industry and Primary Product Class Specialization: 1997

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

NAICS industry or product class code	Industry or primary product class	All establishments	All employees		Production workers			Value added by manufacture (\$1,000)	Cost of materials (\$1,000)	Value of shipments (\$1,000)	Total capital expenditures (\$1,000)
			Number	Payroll (\$1,000)	Number	Hours (1,000)	Wages (\$1,000)				
334412	Bare printed circuit board mfg	1 389	75 091	2 274 117	56 755	114 648	1 366 696	5 789 119	3 827 699	9 595 775	690 768

Table 6a. Products Statistics: 1997 and 1992

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

NAICS product code	Product	1997				1992			
		Number of companies with shipments of \$100,000 or more	Quantity of production for all purposes	Product shipments		Number of companies with shipments of \$100,000 or more	Quantity of production for all purposes	Product shipments	
				Quantity	Value (\$1,000)			Quantity	Value (\$1,000)
334412	Printed circuit boards	N	X	X	9 584 100	N	X	X	6 293 423
3344120	Printed circuit (wiring) boards @	N	X	X	9 584 100	N	X	X	6 293 423
33441200	Printed circuit (wiring) boards	N	X	X	8 714 896	N	X	X	N
3344120000	Printed circuit (wiring) boards	527	X	X	8 714 896	N	X	X	N
3344120Y	Printed circuit (wiring) boards, nsk total	N	X	X	869 204	N	X	X	N
3344120YWW	Printed circuit boards, nsk for nonadministrative-record establishments	N	X	X	553 952	N	X	X	N
3344120YWY	Printed circuit boards, nsk, for administrative-record establishments	N	X	X	315 252	N	X	X	165 419

Additional information is available for this item: see Appendix F.

@ Additional data are available for these codes at the aggregate U.S. level in the Current Industrial Report (CIR) series; see Appendix F for the CIR survey number and title.

\$ This product is primary to more than one industry; see Appendix F for a listing of the related product codes.

Note: For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: P 10 to 19 percent estimated; Q 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by S.

Table 6b. Product Class Shipments for Selected States: 1997 and 1992

[Not applicable for this report]

Table 7. Materials Consumed by Kind: 1997 and 1992

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

NAICS material code	Material consumed	1997		1992	
		Quantity	Delivered cost (\$1,000)	Quantity	Delivered cost (\$1,000)
334412	BARE PRINTED CIRCUIT BOARD MFG				
32721203	Tube blanks	X	1 659	X	D
33441200	Printed circuit boards (without inserted components) for electronic circuitry	X	671 054	X	293 083
001900C4	Printed circuit assemblies, loaded boards or modules (printed circuit boards with inserted electronic components)	X	121 879	X	N
33441300	Semiconductors, including transistors, diodes, rectifiers, and integrated circuits for electronic circuitry	X	125 492	X	67 041
33441400	Capacitors for electronic circuitry	X	34 880	X	11 132
33441500	Resistors for electronic circuitry	X	25 600	X	6 699
001900D3	Other components and accessories for electronic circuitry, n.e.c., except tubes	X	119 537	X	N
32518835	Silicon, hyperpure	X	D	X	D
33141911	Gold and other precious metals, all forms (including ingot, sheet, strip, solder, plating, electrodes, etc.)	X	50 694	X	56 728
33141917	Doped chemicals, and other doped materials for electronic use	X	34 823	X	50 689
33111107	Ferrites (powder and paste)	X	138	X	D
331000AA	Metal powders	X	502	X	D
33410001	Electronic computing equipment	X	2 801	X	430
33593101	Current-carrying wiring devices	X	2 636	X	2 436
33422001	Electronic communication equipment	X	D	X	D
33451501	Electrical instrument mechanisms and meter movements (including instrument relays)	X	4 193	X	497
33331401	Optical instruments and lenses (except sighting, tracking, and fire control)	X	D	X	337
32521105	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc.	X	15 768	X	3 831
32610011	Fabricated plastics products (except gaskets)	X	80 640	X	23 982
332000A9	Sheet metal products, except stampings	X	10 911	X	9 824
332000AC	Metal stampings	X	3 337	X	2 240
33272203	Metal bolts, nuts, screws, washers, rivets, and other screw machine products	X	3 209	X	5 169
33200033	Other fabricated metal products (except forgings)	X	16 731	X	90 988
33210001	Forgings	X	D	X	N
33100035	Castings (rough and semifinished)	X	D	X	232
33120001	Steel shapes and forms (except castings, forgings, and fabricated metal products)	X	D	X	457
33142111	Copper and copper-base alloy shapes and forms (except castings, forgings, and fabricated metal products)	X	45 489	X	42 739
33100039	Aluminum and aluminum-base alloy shapes and forms (except castings, forgings, and fabricated metal products)	X	3 085	X	5 619
33100083	Other nonferrous shapes and forms (except castings, forgings, and fabricated metal products)	X	395	X	6 734
331000A7	Insulated wire and cable, including magnet wire	X	10 025	X	9 768
32220017	Paper and paperboard containers, including shipping sacks and other paper packaging supplies	X	9 615	X	6 482
32518843	Speciality gases	X	495	X	N
32512005	Commodity gases	X	962	X	N
33141957	Silicon chips	X	D	X	N
32599217	Masks	X	6 719	X	N

Table 7. Materials Consumed by Kind: 1997 and 1992—Con.

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

NAICS material code	Material consumed	1997		1992	
		Quantity	Delivered cost (\$1,000)	Quantity	Delivered cost (\$1,000)
334412	BARE PRINTED CIRCUIT BOARD MFG—Con.				
32611305	Resists (photosensitive resin films applied to the surface of a wafer)	X	55 239	X	N
00970099	All other materials and components, parts, containers, and supplies	X	853 188	X	N
00971000	Materials, ingredients, containers, and supplies, n.s.k.	X	906 414	X	789 679

Additional information is available for this item; see Appendix F.

Note: For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: P 10 to 19 percent estimated; Q 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by S.

Appendix A.

Explanation of Terms

BEGINNING- AND END-OF-YEAR INVENTORIES

Respondents were asked to report their beginning-of-year and 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). Beginning 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.

Inventory Data by Stage of Fabrication

Total inventories and three detailed components (1) finished goods, (2) work-in-process, and (3) materials, supplies, fuels, etc., were collected.

When using inventory data by stage of fabrication for “all industries” and at the three-digit subsector 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 an 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 all publication levels.

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.

Included in this item are:

1. Cost of parts, components, containers, etc.—Includes 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. Cost of products bought and sold in the same condition.

3. Cost of fuels consumed for heat and power—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.
4. Cost of purchased electricity—The cost of purchased electric energy represents the amount actually used during the year for heat and power. In addition, information was 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.
5. Cost of contract work—This term applies to work done by others on materials furnished by the manufacturing establishment. The actual cost of the material is to be reported on the cost of materials, parts, and containers line of this item. The term “Contract Work” refers to the fee a company pays to another company to perform a service.

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. If less than \$25,000 of a listed material was consumed by an establishment, the cost data could be reported in the “Cost of all other materials...,” Census material code 00970099. Also, the cost of materials for small establishments for which administrative records or short forms were used was imputed into the “Materials not specified by kind,” Census materials code 00971000.

Duplication in Cost of Materials and Value of Shipment

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 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.

COST OF PURCHASED SERVICES

Annual Survey of Manufactures (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 reflects the costs paid directly by the establishment and excludes 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. 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 was capitalized is considered capital expenditures and is, 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.

Response Coverage Ratio

A response coverage ratio is a measure of the extent to which respondents report for an item. The estimate is made by calculating the ratio value of the weighted total employment data for all the ASM establishments that report the item to the weighted total employment data for all ASM establishments classified in an industry (reporters and non-reporters).

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.

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 truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office functions, 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 utilized as a separate work force.

FRINGE BENEFITS

Fringe benefits 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 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.

GROSS BOOK VALUE OF DEPRECIABLE ASSETS AT BEGINNING OF YEAR (BOY) AND END OF YEAR (EOY)

Total value of depreciable assets is collected on all census forms. It shows the value of depreciable assets for the beginning of year and end of year. The data encompass all fixed depreciable assets on the books of establishments. 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 capital expenditures, less retirements, equaled assets at the end of the year.

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.

PAYROLL

This item includes the gross earnings of all employees on the payrolls of operating manufacturing establishments paid in the calendar year. 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' total supplemental labor costs (those required by Federal and state laws and those incurred voluntarily or as part of collective bargaining agreements).

PRODUCT CODES AND CLASSES OF PRODUCTS

NAICS United States industries are identified by a six-digit code, in contrast to the four-digit SIC code. The longer code accommodates the large number of sectors and allows more flexibility in designing subsectors. Each

product or service is assigned a ten-digit code. The product coding structure represents an extension by the Census Bureau of the six-digit industry classifications of the manufacturing and mining sectors. The classification system operates so that the industrial coverage is progressively narrower with the successive addition of digits. This is illustrated as follows:

NAICS level	NAICS code	Description
Industry	33461	Manufacturing and reproduction of magnetic and optical media
U.S. industry	334612	Reproduction of software
Product class	3346120	Prerecorded compact disc (except software), tape, and record reproducing
BLS link code	3346120X	
Product code	3346120XXX	

As in previous censuses, data were collected for most industries on the quantity and value of individual products shipped. In the 1997 census program, information was collected on the output of almost 10,000 individual product items.

In the new system, there are about 1,500 product classes (seven-digit codes), about 6,000 census products (ten-digit codes), and an additional 3,700 CIR products (ten-digit codes). The ten-digit products are considered the primary products of the industry with the same first six digits.

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 1992 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 (quantity produced and consumed) 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.

PRIMARY PRODUCT CLASS CODE

This file presents selected statistics for establishments according to their degree of specialization in products primary to their industry. This field contains either the six-digit North American Industrial Classification System (NAICS) industry code corresponding to all establishments in the industry, or the seven-digit NAICS product class code for all establishments within the industry that are specialized in a particular product class. Product class specialization is determined by evaluating the ratio of the largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment.

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.

QUANTITY OF ELECTRIC ENERGY CONSUMED FOR HEAT AND POWER

Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy were collected only on the Annual Survey of Manufactures (ASM) form. 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.

RENTAL PAYMENTS

Total rental payments are 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.

RETIREMENTS OF DEPRECIABLE ASSETS

Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during the calendar year. 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.

TOTAL CAPITAL EXPENDITURES (NEW AND USED)

For establishments in operation and any known plants under construction, manufacturers were asked to report their new and used 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.

Totals for expenditures include the costs of assets 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 land and cost of maintenance and repairs charged as current operating expenses.

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. If an establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported.

VALUE ADDED

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, 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.

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 sold without further processing. Included are all items made by or for the establishments from material 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.

In addition to the value for NAICS defined products, aggregates of the following categories of miscellaneous receipts are reported as part of a total establishment’s value of product shipments:

1. Reported contract work—Receipts for work or services that a plant performed for others on their materials.
2. Value of resales—Sales of products brought and sold without further manufacture, processing, or assembly.
3. Other miscellaneous receipts—Such as repair work, installation, sales of scrap, etc.

Industry primary product value of shipments represents one of the three components of value of shipments. These components are:

1. Primary products value of shipments.
2. Secondary product value of shipments.
3. Total miscellaneous receipts.

Primary product shipments is used in the calculations of industry specialization ratio and industry coverage ratio. The term “Value of primary products shipments made in this industry” is used in this publication and refers to the same data.

Duplication in Cost of Materials and Value of Shipment

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.

Specialization and Coverage Ratios

These items are not collected on the report forms but are derived from the data shown in Table 3. 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 5 and data on product shipments shown in Tables 6a and 6b.

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.

Appendix B.

NAICS Codes, Titles, and Descriptions

334412 BARE PRINTED CIRCUIT BOARD MANUFACTURING

This U.S. industry comprises establishments primarily engaged in manufacturing bare (i.e., rigid or flexible) printed circuit boards without mounted electronic components. These establishments print, perforate, plate, screen, etch, or photoprint interconnecting pathways for electric current on laminates.

The data published with NAICS code 334412 include the following SIC industry:

3672 Printed circuit boards

Appendix C.

Coverage and Methodology

MAIL/NONMAIL UNIVERSE

The manufacturing universe includes about 400,000 establishments. This number includes those industries in the North American Industry Classification System (NAICS) definition of manufacturing, but not those industries leaving the manufacturing sector in the classification change. 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 (ASM). 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.

Approximately 40 percent of the manufacturing establishments were small single-establishment companies that were excused from filing a census report. Selection of these establishments was based on two factors: annual payroll and our ability to assign the correct six-digit NAICS industry classification to the establishment. For each four-digit Standard Industrial Classification (SIC) industry code, an annual payroll cutoff was determined. These cutoffs were derived so that the establishments with payroll less than the cutoff were expected to account for no more than 3 percent of the value of shipments for the industry. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed forms. Establishments below the cutoff that could not be directly assigned a six-digit NAICS code were mailed a classification report which requested information for assigning NAICS industry codes. Establishments below the cutoff that could be directly assigned a six-digit NAICS code were excused from filing any report. For below cutoff establishments, information on the physical location, payroll, and receipts was obtained from the administrative records of other Federal agencies under special arrangements that 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” (nsc) categories.

The industry classification codes included in the administrative-record 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 to a four-digit SIC industry and then erroneously re-coded to a six-digit NAICS industry. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes the administrative-record cases had only two- or three-digit SIC group classification codes available in the files. For the 1997 Economic Census – Manufacturing, 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 appropriate six-digit NAICS level. Establishments that did not return the classification form were coded later to those six-digit NAICS industries identified as “All other” industries within the given subsector.

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 establishments covered in the mail canvass were divided into three groups:

- a. ASM sample establishments.

This group accounts for approximately 15 percent of all manufacturing establishments. The ASM panel covers 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. For more information, see the Description of the ASM Survey Sample.

In an economic census 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 additional information on gross book value of assets and capital expenditures. ASM establishments were also requested to provide information on retirements, depreciation, rental payments, and supplemental labor costs. For establishments not included in the ASM, these additional items were estimated using relationships observed in the ASM establishment data. The census statistics for these variables are a sum of the ASM establishment data and the estimated data for non-ASM establishments. ASM establishments were also requested to provide information for selected purchased services. The census statistics for the purchased service items were derived solely from the ASM establishments. See Appendix A, Explanation of Terms for an explanation of these items. The census part of the report form is 1 of 220 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of this many forms to canvass the 480 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 perform. Respondents were requested to identify the products, the value of each product, and, in many 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 materials not identified on the form.

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 30 percent of all manufacturing establishments were included in this group. A variable cutoff, based on administrative-record payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive 1 of the 220 economic census – manufacturing 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 includes approximately 15 percent of all manufacturing establishments. For those industries where application of the variable cutoff for administrative-record 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 31 versions of the short form, which requested summary product and material data and totals but no details on employment, payroll, cost of materials, inventories, and capital expenditures.

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

INDUSTRY CLASSIFICATION OF ESTABLISHMENTS

Each of the establishments covered in the 1997 Economic Census – Manufacturing was classified in 1 of 480 industries (473 manufacturing industries and 7 former manufacturing industries) in accordance with the industry definitions in the 1997 NAICS Manual. This is the first edition of the NAICS Manual and it is a major change from the 1987 SIC Manual that was used previously. Appendix A of the 1997 NAICS Manual notes the comparability between the 1987 SIC and 1997 NAICS classification systems. When applicable, Appendix G of this report shows the product class and product comparability between the two systems for data in this report.

In the NAICS system, an industry is generally defined as a group of establishments that have similar production processes. To the extent practical, the system uses supply-based or production-oriented concepts in defining industries. The resulting group of establishments must be significant in terms of number, value added by manufacture, value of shipments, and number of employees.

The coding system works in such a way that the definitions progressively become narrower with successive additions of numerical digits. In the manufacturing sector for 1997, there are 21 subsectors (three-digit NAICS), 86 industry groups (four-digit NAICS), 184 NAICS industries (five-digit NAICS) that are comparable with Canadian and Mexican classification, and 473 U.S. industries (six-digit NAICS). This represents an expansion of the four-digit SIC-based U.S. industries from 459 in 1987. Product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. In the new system, there are about 1,500 product classes (seven-digit codes), about 6,000 census products, and an additional 3,700 CIR products (ten-digit codes). The ten-digit products are considered the primary products of the industry with the same first six digits. These counts do not include the seven former manufacturing industries that are included in the 1997 Economic Census – Manufacturing.

For the 1997 Economic Census – Manufacturing, all establishments were classified in particular industries based on the products they produced. If an establishment made products of more than one industry, it was classified in the industry with the largest product value. For 1997, there were no “resistance rules” or “frozen industries.”

In ASM years, establishments included in the ASM sample with certainty weights 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. 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 some industries comprise different mixes of establishments in different survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the six-digit NAICS 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-record 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.

Establishments frequently make products classified both in their industry (primary products) and other industries (secondary products). Industry statistics (employment, payroll, value added by manufacture, value of shipments, etc.) reflect the activities of the establishments which may make both primary and secondary products. Product statistics, however, represent the output of all establishments without regard for the classification of the producing establishment. For this reason, when relating the industry statistics, especially the value of shipments, to the product statistics, the composition of the industry’s output should be considered.

The extent to which industry and product statistics may be matched with each other is measured by the primary product specialization ratio and the coverage ratio. The primary product specialization ratio is the proportion of industry shipments accounted for by the primary products of establishments classified in the industry. The coverage ratio is the proportion of product shipments accounted for by establishments classified in the industry.

ESTABLISHMENT BASIS OF REPORTING

The economic census – manufacturing is conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location or establishment. 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 1997, 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.

The 1997 Economic Census – Manufacturing excludes data for central administrative offices (CAOs). These would include separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company. These data are published in a separate report series.

DESCRIPTION OF THE ASM SURVEY SAMPLE

The annual survey of manufactures (ASM) sample is drawn for the second survey year after a census. The most recent sample was drawn for the 1994 survey year based on the 1992 Census of Manufactures. This sample will be in place through the 1998 ASM.

In 1992, there were approximately 370,000 individual manufacturing establishments. For sample efficiency and cost considerations, the 1992 manufacturing population was partitioned into two components for developing estimates within the ASM; a mail stratum and a nonmail stratum.

Mail stratum. The mail stratum of the survey is comprised of larger single-location manufacturing companies and all manufacturing establishments of multiunit companies (companies that operate at more than one physical location). Approximately 230,000 of the 370,000 establishments in the 1992 census were assigned to the mail stratum. On an annual basis, the mail stratum is supplemented with larger, newly active single-location companies identified from a list provided by the Internal Revenue Service (IRS) and new manufacturing locations of multiunit companies identified from the Census Bureau's Company Organization Survey (COS).

For the 1994 survey, a new sample of approximately 58,000 individual establishments was selected from the mail stratum assembled from the 1992 census. Supplemental samples representing both 1993 and 1994 births (newly active establishments that were not included in the 1992 census) were also selected. Establishments selected for the sample are mailed an ASM survey questionnaire for each year through 1998.

The 1994-98 ASM sample design is similar to the one used since 1984. Companies in the 1992 Census of Manufactures with manufacturing shipments of at least \$500 million were defined as company certainties. For these large companies, each manufacturing establishment is included in the mail sample. For the 1994-98 sample, there are approximately 650 certainty companies collectively accounting for over 18,000 establishments.

For the remaining portion of the mail component of the survey, the establishment was defined as the sample unit. All establishments with 250 employees or more were defined as employment certainties. In addition, all establishments producing products in SIC 3571 (Electronic Computers) were defined as certainties. Across these three arbitrary certainty classes, there were approximately 25,000 establishments included in the sample with certainty. Collectively, these certainty establishments accounted for approximately 80 percent of the total value of shipments in the 1992 Census of Manufactures.

Smaller establishments in the remaining portion of the mail stratum were sampled with probabilities ranging from .02 to 1.00. The initial probabilities of selection assigned to these establishments were proportionate to a measure-of-size determined for each establishment. The measure-of-size was a function of the establishment's 1992 industry classification, its 1992 product class data, and the historical variability of the year-to-year estimates of the product class estimates. For each product class (1,755) and four-digit industry (459), a desired reliability

constraint was specified. Using a technique developed by Dr. James R. Chromy of the Research Triangle Institute, the initial establishment probabilities were optimized such that the expected sample satisfied all industry and product class reliability constraints while the sample size was minimized. This technique reduces the likelihood of selecting nonrepresentative samples for individual product classes or industries.

This method of assigning probabilities based on product class shipments is motivated by our primary desire to produce reliable estimates of both product class and industry shipments. The high correlation between shipments and employment, value-added, and other general statistics assures that these variables will also be well represented by the sample. The actual sample selection procedure uses an independent chance of selection method (Poisson sampling) which permits us to prevent small establishments from being selected in consecutive samples without introducing a bias into the survey estimates.

Nonmail component. The initial nonmail component of the survey was comprised of approximately 140,000 small, single-establishment companies that were tabulated as administrative records in the 1992 Census of Manufactures. The nonmail stratum is also supplemented annually using the list of newly active single-location companies provided by the Internal Revenue Service (IRS) and payroll cutoffs. Companies with payroll below the payroll cutoff are added to the nonmail stratum. For this portion of the population, sampling is not used. The data for this group are estimated based on selected information obtained annually from the administrative records of the IRS and Social Security Administration (SSA). This administrative information, which includes payroll, total employment, industry classification, and physical location, is obtained under conditions which safeguard the confidentiality of both tax and census records.

DESCRIPTION OF THE ASM ESTIMATING PROCEDURE

Most of the ASM estimates derived for the mail stratum are computed using a difference estimator. At the establishment level, there is a strong correlation between the current-year data values and the corresponding 1992 (base) data values. Therefore, within the mailed stratum, for each item at each level of aggregation, an estimate of the "difference" between the current year and the base year is computed from sample cases and added to the corresponding base-year values. For the 1993-1997 ASM estimates, the 1992 Census of Manufactures values serve as the base year. For the 1998 ASM, the base will be updated to be the 1997 Economic Census – Manufacturing.

Due to the positive year-to-year correlation, estimates derived using this methodology are generally more reliable than comparable estimates developed from the current sample data alone. Estimates for the capital expenditures variables are not generated using the difference

estimator because the year-to-year correlations are considerably weaker. The standard linear estimator is used for these variables.

For the nonmail stratum, estimates for payroll and employment are directly tabulated from the administrative-record data provided by IRS and SSA. Estimates of data other than payroll and employment are developed from industry averages. Although the nonmail stratum contains approximately 170,000 individual establishments in 1994, it accounts for less than 2 percent of the estimate for total value of shipments at the total manufacturing level.

Corresponding estimates for the mail and nonmail components are combined to produce the estimates included in this publication.

QUALIFICATIONS OF THE ASM DATA

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

The particular sample selected for the ASM is one of many 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 theoretically comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected ASM statistics in this report. They are represented 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:

From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.

From two standard errors below to two standard errors above the derived estimate for about 19 out of 20 of all possible samples.

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 at 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 during 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 moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown. Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be combined with higher level totals, creating a broader aggregate, which then may be of acceptable reliability.

DATA FROM THE CURRENT INDUSTRIAL REPORTS (CIR)

The CIR program provides product statistics for selected manufacturing industries at the U.S. level annually and, in some cases, monthly and/or quarterly. When detail product data are collected in the CIR, they are not also collected in the census. However, the annual CIR data are included in the census Product Summary report.

The CIR program uses a unified data collection, processing, and publication system. The Census Bureau updates the survey panels for most reports annually and reconciles the estimates to the results of the broader-based annual survey of manufactures and the economic

census – manufacturing. The economic census – manufacturing provides a complete list of all producers of the products covered by the CIR program and serves as the primary source for CIR sampling. Where a small number of producers exist, CIR surveys cover all known producers of a product. However, when the number of producers is large, cutoff and random sampling techniques are used. Surveys are continually reviewed and modified to provide the most up-to-date information on products produced. While the CIR program includes both mandatory and voluntary surveys, the annual data are mandatory.

DUPLICATION IN COST OF MATERIALS AND VALUE OF SHIPMENTS

Data for cost of materials and value of shipments include varying amounts of duplication, especially at higher levels of aggregation. This is because the products of one establishment may be the materials of another. The value added statistics avoid this duplication and are, for most purposes, the best measure for comparing the relative economic importance of industries and geographic areas.

VALUE OF INDUSTRY SHIPMENTS COMPARED WITH VALUE OF PRODUCT SHIPMENTS

The 1997 Economic Census – Manufacturing shows value of shipments data for industries and products. In the industry statistics tables and files, 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 the products statistics tables and files represent the total value of all products shipped that are classified as primary to an industry regardless of the classification of the producing establishment.

Appendix D. Geographic Notes

Not applicable for this report.

Appendix E. Metropolitan Areas

Not applicable for this report.

Appendix F. Footnotes for Products Statistics and Materials Consumed by Kind

Part 1. **Products Statistics (Tables 6a and 6b)**

NAICS product code	Footnote
@3344120	For additional detail, see Current Industrial Report MA334Q, Semiconductors and Electronic Components.

Part 2. **Materials Consumed by Kind (Table 7)**

Not applicable.

Appendix G. Comparability of Product Classes and Product Codes: 1997 to 1992

1997 published	1997 collected	1992 published	1997 published	1997 collected	1992 published	1997 published	1997 collected	1992 published
3341111 pt.....	35711 pt.....	35713	334220W pt.....	36790 pt.....	36790 pt	3344174.....	36782.....	36782
3341111 pt.....	35711 pt.....	35714	334220WYWW pt...	3663000.....	3663000	3344174000.....	3678200.....	3678200
3341111000 pt.....	3571100 pt.....	3571300	334220WYWW pt...	3679000 pt.....	3679000 pt	3344177.....	36783.....	36783
3341111000 pt.....	3571100 pt.....	3571400	334220WYWW pt...	3663002.....	3663002	3344177000.....	3678300.....	3678300
3341117 pt.....	35712 pt.....	35715	334220WYWW pt...	3679002 pt.....	3679002 pt	334417A.....	36784.....	36784
3341117 pt.....	35712 pt.....	35716	3342901.....	36691.....	36691	334417A000.....	3678400.....	3678400
3341117000 pt.....	3571200 pt.....	3571500	3342901000.....	3669100.....	3669100	334417D.....	36785.....	36785
3341117000 pt.....	3571200 pt.....	3571600	3342902.....	36692.....	36692	334417D000.....	3678500.....	3678500
334111D pt.....	35719 pt.....	35717	3342902000.....	3669200.....	3669200	334417W.....	36780.....	36780
334111D pt.....	35719 pt.....	35718	3342903.....	36693.....	36693	334417WYWW.....	3678000.....	3678000
334111D000 pt.....	3571900 pt.....	3571700	3342903000.....	3669300.....	3669300	334417WYWW.....	3678002.....	3678002
334111D000 pt.....	3571900 pt.....	3571800	334290W.....	36690.....	36690	3344184.....	36613 pt.....	36613 pt
334111W.....	35710.....	35710	334290WYWW.....	3669000.....	3669000	3344184000.....	3661305.....	3661300 pt
334111WYWW.....	3571000.....	3571000	334290WYWW.....	3669002.....	3669002	334418A.....	36798.....	36798
334111WYWW.....	3571002.....	3571002	3343101.....	36511.....	36511	334418A000.....	3679800.....	3679800
3341121.....	35721.....	35721	3343101000.....	3651100.....	3651100	334418W pt.....	36610 pt.....	36610 pt
3341121000.....	3572100.....	3572100	3343102.....	36512.....	36512	334418W pt.....	36790 pt.....	36790 pt
3341124.....	35722.....	35722	3343102000.....	3651200.....	3651200	334418WYWW pt.....	3661000 pt.....	3661000 pt
3341124000.....	3572200.....	3572200	3343103.....	36514.....	36514	334418WYWW pt.....	3679000 pt.....	3679000 pt
334112W.....	35720.....	35720	3343103000.....	3651400.....	3651400	334418WYWW pt.....	3661002 pt.....	3661002 pt
334112WYWW.....	3572000.....	3572000	3343104.....	36515.....	36515	334418WYWW pt.....	3679002 pt.....	3679002 pt
334112WYWW.....	3572002.....	3572002	3343104000.....	3651500.....	3651500	3344191.....	36791.....	36791
3341131.....	35751.....	35751	334310W.....	36510.....	36510	3344191000.....	3679100.....	3679100
3341131000.....	3575100.....	3575100	334310WYWW.....	3651000.....	3651000	3344194.....	36795.....	36795
3341134.....	35752.....	35752	334310WYWW.....	3651002.....	3651002	3344194000.....	3679500.....	3679500
3341134000.....	3575200.....	3575200	3343111.....	36713.....	36713	3344197.....	36796.....	36796
334113W.....	35750.....	35750	3343111000.....	3671300.....	3671300	3344197000.....	3679600.....	3679600
334113WYWW.....	3575000.....	3575000	3344114.....	36714.....	36714	334419D.....	36799 pt.....	36799 pt
334113WYWW.....	3575002.....	3575002	3344114000.....	3671400.....	3671400	334419D101.....	3679930.....	3679930
3341191 pt.....	35771.....	35771	3344117.....	36715.....	36715	334419D106.....	3679927.....	3679920 pt
3341191 pt.....	36992 pt.....	36992 pt	3344117000.....	3671500.....	3671500	334419DYV.....	3679900 pt.....	3679900 pt
3341191000 pt.....	3577100.....	3577100	334411W.....	36710.....	36710	334419W.....	36790 pt.....	36790 pt
3341191000 pt.....	3699253.....	3699200 pt	334411WYWW.....	3671000.....	3671000	334419WYWW.....	3679000 pt.....	3679000 pt
3341194.....	35772.....	35772	334411WYWW.....	3671002.....	3671002	334419WYWW.....	3679002 pt.....	3679002 pt
3341194000.....	3577200.....	3577200	3344120.....	36720.....	36720	3345101 pt.....	36992 pt.....	36992 pt
3341197.....	35784 pt.....	35784 pt	3344120000.....	3672000 pt.....	3672000 pt	3345101 pt.....	38450 pt.....	38450 pt
3341197000 pt.....	3578400.....	3578400 pt	3344120YWW.....	3672000 pt.....	3672000 pt	3345101000 pt.....	3699261.....	3699200 pt
3341197000 pt.....	3578420.....	3578400 pt	3344120YWW.....	3672002.....	3672002	3345101000 pt.....	3845000 pt.....	3845000 pt
334119D.....	35789 pt.....	35789 pt	3344131.....	36741.....	36741	3345103.....	38424.....	38424
334119D000 pt.....	3578900.....	3578900 pt	3344131000.....	3674100.....	3674100	3345103100.....	3842400.....	3842400
334119D000 pt.....	3578920.....	3578900 pt	3344134.....	36742.....	36742	334510W pt.....	36990 pt.....	36990 pt
334119W pt.....	35770.....	35770	3344134000.....	3674200.....	3674200	334510W pt.....	38420 pt.....	38420 pt
334119W pt.....	35780 pt.....	35780 pt	3344137.....	36743.....	36743	334510W pt.....	38450 pt.....	38450 pt
334119W pt.....	36990 pt.....	36990 pt	3344137000.....	3674300.....	3674300	334510WYWW pt.....	3699000 pt.....	3699000 pt
334119WYWW pt.....	3577000.....	3577000	334413A.....	36749.....	36749	334510WYWW pt.....	3842000 pt.....	3842000 pt
334119WYWW pt.....	3578000 pt.....	3578000 pt	334413A000.....	3674900.....	3674900	334510WYWW pt.....	3845000 pt.....	3845000 pt
334119WYWW pt.....	3699000 pt.....	3699000 pt	334413W.....	36740.....	36740	334510WYWW pt.....	3699002 pt.....	3699002 pt
334119WYWW pt.....	3577002.....	3577002	334413WYWW.....	3674000.....	3674000	334510WYWW pt.....	3842002 pt.....	3842002 pt
334119WYWW pt.....	3699002 pt.....	3699002 pt	334413WYWW.....	3674002.....	3674002	334510WYWW pt.....	3845002.....	3845002
334119WYWW pt.....	3578002 pt.....	3578002 pt	3344140.....	36750.....	36750	3345111.....	38121.....	38121
334119WYWW pt.....	3699002 pt.....	3699002 pt	3344140000.....	3675000 pt.....	3675000 pt	3345111000.....	3812100.....	3812100
3342101.....	36611.....	36611	3344140YWW.....	3675000 pt.....	3675000 pt	3345113 pt.....	36992 pt.....	36992 pt
3342101000.....	3661100.....	3661100	3344140YWW.....	3675002.....	3675002	3345113 pt.....	38122.....	38122
3342104.....	36613 pt.....	36613 pt	3344150.....	36760.....	36760	3345113000 pt.....	3699211.....	3699200 pt
3342104000 pt.....	3661301.....	3661300 pt	3344150000.....	3676000 pt.....	3676000 pt	3345113000 pt.....	3812200.....	3812200
3342104000 pt.....	3661303.....	3661300 pt	3344150YWW.....	3676000 pt.....	3676000 pt	334511W pt.....	36990 pt.....	36990 pt
3342104000 pt.....	3661300.....	3661300 pt	3344150YWW.....	3676002.....	3676002	334511W pt.....	38120.....	38120
3342107.....	36614 pt.....	36614 pt	3344160 pt.....	36610 pt.....	36610 pt	334511WYWW pt.....	3699000 pt.....	3699000 pt
3342107000 pt.....	3661403.....	3661400 pt	3344160 pt.....	36614 pt.....	36614 pt	334511WYWW pt.....	3812000.....	3812000
3342107000 pt.....	3661400 pt.....	3661400 pt	3344160 pt.....	36770.....	36770	334511WYWW pt.....	3699002 pt.....	3699002 pt
334210W.....	36610 pt.....	36610 pt	3344160 pt.....	38250 pt.....	38250 pt	334511WYWW pt.....	3812002.....	3812002
334210WYWW.....	3661000 pt.....	3661000 pt	3344160 pt.....	38250 pt.....	38250 pt	3345120.....	38220.....	38220
334210WYWW.....	3661002 pt.....	3661002 pt	3344160 pt.....	38250 pt.....	38250 pt	3345120000.....	3822000 pt.....	3822000 pt
3342201.....	36631.....	36631	3344160 pt.....	38252 pt.....	38252 pt	3345120YWW.....	3822000 pt.....	3822000 pt
3342201000.....	3663100.....	3663100	3344160000 pt.....	3661401.....	3661400 pt	3345120YWW.....	3822002.....	3822002
3342203 pt.....	36632.....	36632	3344160000 pt.....	3661400 pt.....	3661400 pt	3345130.....	38230.....	38230
3342203 pt.....	36799 pt.....	36799 pt	3344160000 pt.....	3677000 pt.....	3677000 pt	3345130000.....	3823000 pt.....	3823000 pt
3342203000 pt.....	3663200.....	3663200	3344160000 pt.....	3825210.....	3825200 pt	3345130YWW.....	3823000 pt.....	3823000 pt
3342203000 pt.....	3679900 pt.....	3679900 pt	3344160000 pt.....	3825200 pt.....	3825200 pt	3345130YWW.....	3823002.....	3823002
3342203000 pt.....	3679925.....	3679920 pt	3344160YWW pt.....	3661000 pt.....	3661000 pt	3345141.....	38242.....	38242
3342207.....	36793.....	36793	3344160YWW pt.....	3677000 pt.....	3677000 pt	3345141000.....	3824200.....	3824200
3342207000.....	3679300.....	3679300	3344160YWW pt.....	3825000 pt.....	3825000 pt	3345143.....	38243.....	38243
334220W pt.....	36630.....	36630	3344160YWW pt.....	3661002 pt.....	3661002 pt	3345143000.....	3824300.....	3824300
			3344160YWW pt.....	3677002.....	3677002	3345145.....	38244.....	38244
			3344160YWW pt.....	3825002 pt.....	3825002 pt	3345145000.....	3824400.....	3824400
			3344171.....	36781.....	36781			
			3344171000.....	3678100.....	3678100			

1997 published	1997 collected	1992 published	1997 published	1997 collected	1992 published	1997 published	1997 collected	1992 published
334514W	38240	38240	3345183 pt.....	38732	38732	3345197 pt.....	38295 pt	38295 pt
334514WYWW	3824000	3824000	3345183101	3873201	3873201	3345197000 pt	3699223	3699200 pt
334514WYWW	3824002	3824002	3345183106	3873202	3873202	3345197000 pt	3829520	3829500 pt
3345151	38251	38251	3345183111	3873203	3873203	3345199 pt.....	36992 pt	36992 pt
3345151000	3825100	3825100	3345183116	3873209	3873209	3345199 pt.....	38296	38296
3345153	38252 pt	38252 pt	3345183121	3873253	3873253	3345199000 pt	3699225	3699200 pt
3345153000 pt	3825220	3825200 pt	3345183126	3873254	3873254	3345199000 pt	3829600	3829600
3345153000 pt	3825200 pt	3825200 pt	3345183131	3579920	3579900 pt	3345199 pt.....	36990 pt	36990 pt
3345155	38253	38253	3345183136	3873259	3873259	334519W pt.....	38290 pt	38290 pt
3345155000	3825300	3825300	3345183141	3873258	3873258	334519WYWW pt...	3699000 pt	3699000 pt
334515W	38250 pt	38250 pt	3345183146	3873261	3873261	334519WYWW pt...	3829000 pt	3829000 pt
334515WYWW	3825000 pt	3825000 pt	3345183151 pt	3495331	3495398 pt	334519WYWW pt...	3829000 pt	3829000 pt
334515WYWW	3825002 pt	3825002 pt	3345183151 pt	3579A20	3579A00 pt	334519WYWW pt	3699002 pt	3699002 pt
3345160 pt.....	36990 pt	36990 pt	3345183151 pt	3873269	3873269	334519WYWW pt	3829002 pt	3829002 pt
3345160 pt.....	36992 pt	36992 pt	3345183YWW pt	3495300 pt	3495300 pt	3346110	73720	73720
3345160000 pt	38260	38260	3345183YWW pt	3579900 pt	3579900 pt	3346110000	7372001	7372000 pt
3345160000 pt	3699213	3699200 pt	3345183YWW pt	3579A00	3579A00 pt	3346110YWW	7372000	7372000 pt
3345160000 pt	3826000 pt	3826000 pt	3345183YWW pt	3873200	3873200	3346110YWW	7372002	7372000 pt
3345160YWW pt	3699000 pt	3699000 pt	334518W pt	34950 pt	34950 pt	3346120 pt.....	36520	36520
3345160YWW pt	3826000 pt	3826000 pt	334518W pt	35790 pt	35790 pt	3346120 pt.....	78190	78190
3345160YWW pt	3699002 pt	3699002 pt	334518W pt	38730	38730	3346120101	3652008	3652008
3345160YWW pt	3826002	3826002	334518WYWW pt	3495000 pt	3495000 pt	3346120201	3652013	3652013
3345170	38440	38440	334518WYWW pt	3579000 pt	3579000 pt	3346120301	7819001	7819000 pt
3345170000	3844000 pt	3844000 pt	334518WYWW pt	3873000	3873000	3346120303	7819003	7819000 pt
3345170YWW	3844000 pt	3844000 pt	334518WYWW pt	3495002 pt	3495002 pt	3346120501	3652003	3652009 pt
3345170YWW	3844002	3844002	334518WYWW pt	3579002 pt	3579002 pt	3346120504	3652005	3652005
3345181	38731	38731	334518WYWW pt	3873002	3873002	3346120507	3652006	3652006
3345181101	3873104	3873104	3345191	38291	38291	3346120511	3652009	3652009 pt
3345181106	3873114	3873114	3345191000	3829100	3829100	3346120514	3652012	3652012
3345181YWW	3873100	3873100	3345193	38292	38292	3346120517	3652019	3652019
3345183 pt.....	34953 pt	34953 pt	3345193000	3829200	3829200	3346120YWW pt	3652000	3652000
3345183 pt.....	35799 pt	35799 pt	3345195	38294	38294	3346120YWW pt	7819000	7819000 pt
3345183 pt.....	3579A pt	3579A pt	3345195000	3829400	3829400	3346120YWW pt	3652002	3652002
			3345197 pt.....	36992 pt	36992 pt	3346120YWW pt	7819002	7819000 pt

