

The following pages are excerpts from the “ Advanced Electronics and Related Industries in Ohio ” report. The full report is 79 pages in length and includes appendices of referenced Advanced Electronics Industry data. The “ Advanced Electronics and Related Industries in Ohio ” report may be purchased for \$20.00 (ID no. BB14). For additional information or to purchase the full report please contact the Office of Strategic Research.

ADVANCED ELECTRONICS AND RELATED INDUSTRIES IN OHIO

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OHIO'S STANDING

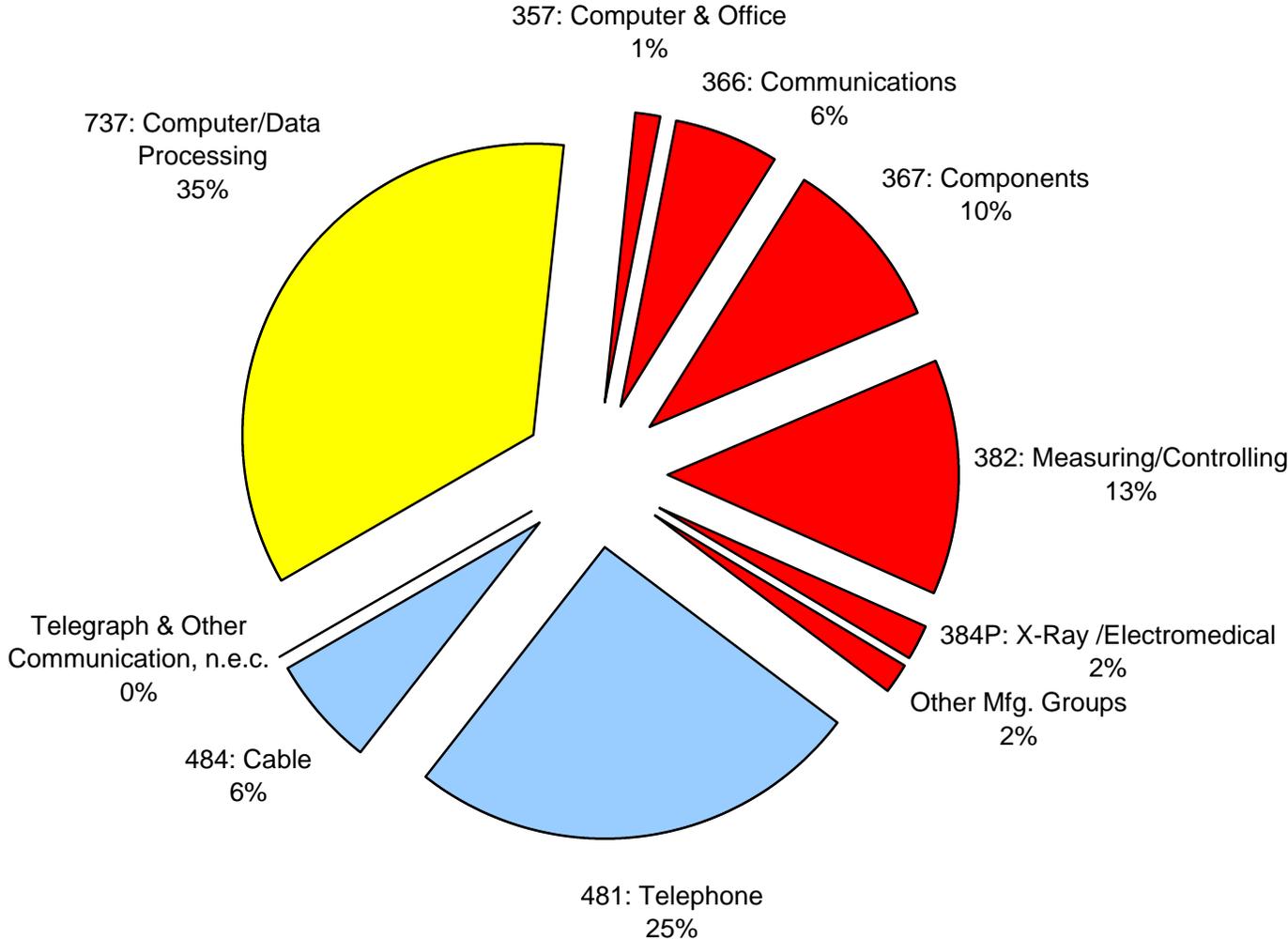
Confidentiality considerations prevent an exact determination, but data from the Census Bureau appear to show that:

- Over 4,500 industry establishments in Ohio employed at least 118,000 people in 1996—about three percent of the U.S. industry's establishments and work force. Like the U.S., the vast majority of establishments and employment are in the related service-providing industries.
- Ohio ranked about 14th in the nation in producing advanced electronic goods in 1996 with about \$3.8 billion; this was 1.6 percent of the nation's output (as measured by value added in manufacturing). California, Texas, Massachusetts, Pennsylvania and New York are the five leading states.
- Industries with national employment concentrated in Ohio include: calculating and accounting equipment (SIC 3578), electron tubes (SIC 3671), environmental controls (SIC 3822), process control instruments (SIC 3823), measuring and controlling devices n.e.c. (SIC 3829), X-ray apparatus and tubes (SIC 3844), and information retrieval services (SIC 7375).

Information from other sources shows that:

- 26 companies on Fortune magazine's U.S. 1,000 or global 500 lists have manufacturing plants in Ohio; five of these companies have their headquarters in the state.
- Lucent Technologies is the largest employer in Ohio's advanced electronics manufacturing cluster with 7,000 workers, followed by NCR's 3,500. Philips Electronics North America, the General Electric Co. PLC (U.K.), GE (U.S.), and Emerson Electric each employ at least 1,600 people.
- Another 14 companies on Fortune magazine's U.S. 1,000 list are major employers in the related service-providing industries cluster; two of them are head-quartered in Ohio.

Employment in Ohio's Advanced Electronics & Related Industries: 1996
(SIC Group & Percentage of 118,736 Jobs)



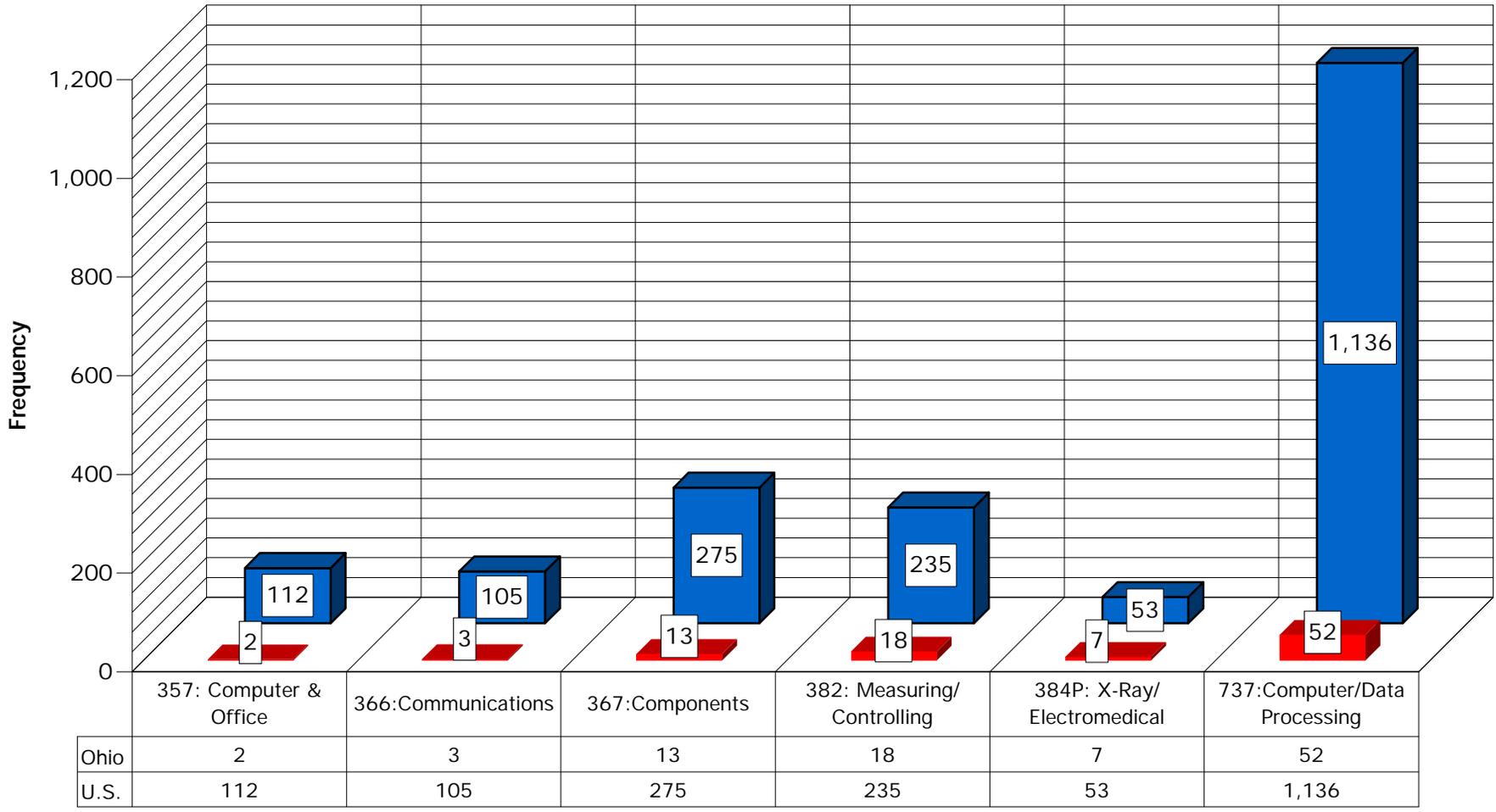
DESCRIPTION OF THE INDUSTRY IN OHIO

Over 4,500 establishments employed more than 118,000 people in Ohio's advanced electronics and related industries during 1996. The industry is dominated by the related service-providing industries (SICs 481, 482, 484, 498, and 737). This cluster of groups has seven-eighths of the establishments and provides two-thirds of the jobs. Computer and data processing (SIC 737) is the largest industry group, both in terms of establishments and jobs—over 2,700 and 41,000, respectively.

Other industry groups employing more than 10,000 workers are telephone communications (SIC 481)—almost 30,000, measuring and controlling devices (SIC 382)—about 15,700, and electronic components and accessories (SIC 367)—11,500.

Despite being a significant portion of employment in Ohio, only three percent of the nation's advanced electronics and related industries establishments and jobs are found in Ohio. In other words, the industry is not concentrated here. (Ohio's has four percent of U.S. establishments and 4.5 percent of jobs excluding almost all government, railroad, agricultural, and the self-employed workers.) There are exceptions to this generalization: calculating and accounting equipment (SIC 3578), electron tubes (SIC 3671) environmental controls (SIC 3822), process control instruments (SIC 3823), measuring and controlling devices n.e.c. (SIC 3829), X-ray apparatus and tubes (SIC 3844), and information retrieval services (SIC 7375).

**Industry Establishments with Foreign Participation in Ohio & U.S.: 1992
(SIC Group & Frequency)**



Industry Group

FOREIGN INVESTMENT IN OHIO

Foreign investment is an important part of advanced electronics and related industries in Ohio. According to the U.S. Dept. of Commerce, 95 of the 3,594 industry establishments in Ohio had at least 10 percent direct or indirect foreign-based ownership in 1992. These establishments employed about 13,000 out of a total of 111,000. Overall, the overwhelming majority of industry establishments and employment are in the related service-providing industries. However, industry establishments with foreign-based participation are much more likely to be in advanced electronics manufacturing. Among industry establishments with foreign-based participation, the vastly greater part of employment is in advanced electronics manufacturing. In fact, in Ohio, there appeared to be no communications establishments with foreign-based participation in 1992.

Foreign industry investment in Ohio was particularly concentrated in Office Machines n.e.c. (SIC 3579), Communications Equipment n.e.c. (SIC 3669), Electron Tubes (SIC 3671), Semiconductors and Related Devices (SIC 3674), Measuring and Controlling Devices (SIC 382), X-ray and Electromedical Devices (SIC 384P), and Computer Maintenance and Repair (SIC 7378). However, in many other advanced electronics manufacturing industries there appeared to be no foreign-based participation.

The Office of Strategic Research published a different and more current indicator of foreign-based economic activity in Ohio in 1998. A listing from Foreign Corporations with Operations in Ohio shows 62 companies in advanced electronics and related industries either as owners or in joint ventures with American companies. Twenty-two were British, eleven were Japanese, eight were Canadian, seven were German, three each were French and Swiss, two each were Dutch and Israeli. There was one each from Denmark, Finland, Italy, and South Korea. Elsasg Bailey, the General Electric Co. PLC, Matsushita Electric Corp. (Panasonic), Philips Electronics, and Reed Elsevier's LEXIS-NEXIS each employ over 1,000 people in Ohio.

**OHIO'S ECONOMIC CONTRIBUTION TO ADVANCED ELECTRONICS
MANUFACTURING:**

Industry	Ohio's Value Added (millions)	Percent of U.S.	Apparent Rank	Top 5 States
Mfg. Subtotal	\$3,762.9	1.6%	14th	CA, TX, MA, PA, NY
SIC 357: Computer/Office	\$ 300.0	0.7%	14th	CA, TX, NH, CO, OR
SIC 365 Audio/Video	\$ 0.0	n.a.	n.a.	CA, PA, IN, MA, TN
SIC 366 Communications	\$1,120.4	2.9%	6th	CA, MA, IL, TX, FL
SIC 367 Components	\$1,048.9	1.2%	13th	CA, TX, PA, AZ, OR
SIC 381 Search/Navigate	\$ 0.0	n.a.	n.a.	CA, FL, NY, TX, WA
SIC 382 Measure/Control	\$1,293.6	4.5%	7th	CA, MA, CT, PA, NY
SIC 384P X-ray plus	n.a.	n.a.	n.a.	n.a.
SIC 386 Photographic	\$ 0.0	n.a.	n.a.	NY, MA, NJ, CA, PA

Note: n.a. – not applicable, not available.

OHIO'S RELATIVE STANDING AND ECONOMIC CONTRIBUTION

Confidentiality considerations prevent an exact determination, but Ohio ranked 14th overall in the production of advanced electronics in 1996, as judged by the value added in the Census Bureau's Annual Survey of Manufactures. The five highest-ranking states (in descending order) probably were California, Texas, Massachusetts, Pennsylvania, and New York. The principal components of Ohio's rank are its sixth rank in communications equipment (SIC 366--\$1.1billion) and seventh rank in measuring and controlling devices (SIC 382--\$1.3 billion). Ohio ranked about 13th in producing electronic components and accessories (SIC 367--\$1billion), and 14th in the production of computer and office equipment (SIC 357--\$.3billion). So little production of household audio and video equipment (SIC 365), search and navigation equipment (SIC 381), and photographic equipment and supplies (SIC 386) happens in Ohio that these data are seldom captured in the Annual Survey.² California appears to rank first in every one of these industry groups except photographic equipment and supplies. No information pertaining to X-ray and electromedical equipment (SIC 384P) is available on an annual basis.

Ohio's greatest relative contribution to advanced electronics manufacturing is in measuring and controlling devices. Manufacturers in Ohio averaged 4.8 percent of the value added for the U.S. during the 1988—1996 period. The next greatest contribution came from communications equipment—3.2 percent of value added in the U.S. Manufacturers in Ohio added less than two percent to the U.S. value of computer and office equipment, electronic components and accessories, and search and navigation equipment. On the whole, advanced electronics manufacturing is not concentrated in Ohio.

INTRODUCTION

The American Electronics Association (AEA) produced its Cyberstates report on “high tech” industries in 1998. That report summarized establishment, job and payroll statistics on advanced electronics manufacturing and related service-providing industries for the 50 states and the District of Columbia. It also ranked the states on a variety of subjects and provided comparisons with other industries.

This report provides more detailed information about the industry in Ohio, how it has changed over time, and compares the state with the nation. The report is organized into four sections. The first examines the size of the industry and its components. This is followed by a geographic analysis presenting regional information and profiling the state's notable advanced electronics producers. The third section reviews industry trends since 1988 and the forecast for future employment. The fourth section contains a glossary of technical terms, detailed SIC code definitions, and a substantial database for those wishing to further their understanding of industry trends.

Unlike Cyberstates, which used data mainly from the Bureau of Labor Statistics, the statistics used in this report came primarily from the U.S. Bureau of the Census. Secondary sources are the Ohio Bureau of Employment Services, the U.S. Bureau of Labor Statistics, American Business Directories, Harris InfoSource International, and the Minnesota IMPLAN Group. Specific publications are listed under sources and references.

HOW ADVANCED ELECTRONICS AND RELATED INDUSTRIES ARE GROUPED:

The Advanced Electronics Manufacturing cluster:

SIC

Code Industry Group Title—Number of Industries in the Group

- 357: Computer and Office Equipment—seven industries
- 365: Household Audio and Video Equipment—two industries
- 366: Communications Equipment—three industries
- 367: Electronic Components and Accessories—eight industries
- 381: Search and Navigation Equipment—one industry
- 382: Measuring and Controlling Devices—eight industries
- 384P: X-ray and Electromedical Devices—two industries
- 386: Photographic Equipment and Supplies—one industry

The Related Service-Providing Industries cluster:

SIC

Code Industry Group Title—Number of Industries in the Group

- 481: Telephone Communications—two industries
- 482: Telegraph and Other Communications—one industry
- 484: Cable and Other Pay TV Services—one industry
- 489: Communications Services, n.e.c.—one industry
- 737: Computer and Data Processing Services—nine industries

INDUSTRY DEFINITION

Many of the nation's economic statistics are gathered and published according to the Standard Industrial Classification (SIC) System. Establishments producing goods or services sufficiently alike are classified in the same industry. A four-digit SIC code is assigned to each industry. Closely related industries form an industry group. The first three digits of the four-digit code indicate the group to which the industries belong.

Advanced electronics and related industries are divided into two clusters of groups: advanced electronics manufacturing (SIC codes 357, 365, 366, 367, 381, part of 384, and 386) and related service-providing industries (SIC codes 481, 482, 484, 489, and 737). The two-part scheme follows the AEA's definition with two changes—not for content, but for presentation.¹

The former cluster includes establishments manufacturing computer and office equipment, household audio and video equipment, communications equipment, electronic components and accessories, search and navigation equipment, measuring and controlling devices, X-ray and electromedical equipment, and photographic equipment and supplies. The latter cluster includes establishments using advanced electronic equipment as part of the services they provide: telephone, telegraph, and radiotelephone (*i.e.*, cellular) communications, cable TV, and computer programming and data processing services.

The key component linking the advanced electronics manufacturing groups is the semiconductor chip (SIC 3674). A semiconductor chip is a wafer of silicon whose imprinted transistors and circuits are electrically integrated in a variety of configurations (McGovern, 1998). Such chips are integral parts of the equipment used by the service-providing industries, but communications is also characterized by the move to digital signal transmission (often done through fiber-optic cables) and processing (Donald, 1998).

Excluded from this report are wholesalers and retailers of the various products, as well as radio and TV broadcasters. Also excluded from this report are manufacturers whose products may include advanced electronics as an option rather than a critical component. Examples of the latter include washing machines and ovens.

See the Appendices for further industry explanations and examples.