

Industry & Trade Summary

**Air-Conditioning
Equipment and Parts**

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Washington, DC 20436**



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PREFACE

In 1991 the U.S. International Trade Commission initiated its current Industry and Trade Summary series of informational reports on the thousands of products imported into and exported from the United States. Each summary addresses a different commodity/industry area and contains information on product uses, U.S. and foreign producers, and customs treatment. Also included is an analysis of the basic factors affecting trends in consumption, production, and trade of the commodity, as well as those bearing on the competitiveness of U.S. industries in domestic and foreign markets.¹

This report on air-conditioning equipment and parts covers the period 1988 through 1992 and represents one of approximately 250 to 300 individual reports to be produced in this series during the first half of the 1990s. Listed below are the individual summary reports published to date on the machinery and transportation sector.

<i>USITC publication number</i>	<i>Publication date</i>	<i>Title</i>
2430	November 1991	Aircraft, Spacecraft, and Related Equipment
2505	April 1992	Construction and Mining Equipment
2546	August 1992	Agricultural and Horticultural Machinery
2570	November 1992	Electric Household Appliances
2633	June 1993	Textile Machinery
2746	March 1994	Aircraft and Reaction Engines, other Gas Turbines, and Parts
2751	March 1994	Certain Motor-Vehicle Parts and Accessories
2756	March 1994	Air-Conditioning Equipment and Parts

¹ The information and analysis provided in this report are for the purpose of this report only. Nothing in this report should be construed to indicate how the Commission would find in an investigation conducted under statutory authority covering the same or similar subject matter.

CONTENTS

	<i>Page</i>
Preface	i
Introduction	1
U.S. industry profile	1
Industry structure	1
Marketing methods and technology trends	6
Consumer characteristics and factors affecting demand	6
Environmental regulations	6
Foreign industry profile	7
U.S. trade measures	8
Tariff measures	8
Nontariff measures	8
U.S. Government trade-related investigations	8
Foreign trade measures	8
Tariff measures	8
Nontariff measures	10
U.S. market	10
Consumption	10
Shipments	11
Imports	11
Foreign markets	12
Foreign market profile	12
U.S. exports	13
U.S. trade balance	13
Appendix	
A. Explanation of tariff and trade agreement terms	A-1
Figures	
1. U.S. air-conditioning equipment and parts industry: Principal raw materials, producer types, major products, and principal consumers	2
2. Major U.S. producers of air-conditioning equipment and parts	3
3. U.S. market share of leading air-conditioning and refrigeration producers in 1992	3
4. U.S. imports of air-conditioning equipment and parts, 1992	12
Tables	
1. Air-conditioning equipment and parts: Number of employees, production workers, and production workers' average hourly earnings, by applicable SIC industries, 1988-92	4
2. Air-conditioning equipment and parts: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1993; U.S. exports, 1992; and U.S. imports, 1992	9
3. Air-conditioning equipment and parts: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent consumption, 1988-92	10
4. Air-conditioning equipment and parts: U.S. producers' shipments of air-conditioning equipment and parts, by product classes, 1988-92	11
5. Air-conditioning equipment and parts: U.S. imports for consumption, by principal sources, 1988-92	12
6. Air-conditioning equipment and parts: U.S. exports of domestic merchandise, by principal sources, 1988-92	14
7. Air-conditioning equipment and parts: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected country and country group, 1988-92	15

INTRODUCTION

This summary provides information on the industry producing air-conditioning equipment and parts. These products are used in residential, commercial, and industrial applications.¹ The summary covers the period 1988 through 1992, and is organized into three major sections: U.S. and foreign industry profiles; tariffs and nontariff measures; and U.S. industry performance in domestic and foreign markets. Appendix A explains tariff and trade agreement terms and gives further statistical information on the industry.

Air-conditioning equipment and parts covered in this summary are classified in headings 8414 and 8415 of the Harmonized Tariff Schedule of the United States (HTS). The principal types of equipment covered are unitary air-conditioning equipment (including heat pumps), room air-conditioners, liquid chilling units, compressors, and fans and blowers. Also covered are air and vacuum pumps. Air-conditioning equipment is an essential component of modern day living.

Unitary air-conditioning equipment accounts for the majority of air-conditioning equipment purchases worldwide. Unitary air-conditioners consist of a condensing unit (compressor and condenser) and an evaporation coil. If the condensing unit is enclosed in the same casing as the evaporation coil, it is commonly referred to as a self-contained, or single-package unit. Unitary air-conditioners are used to cool single and multifamily dwelling units and small commercial buildings. They may also be used in multiples to cool large low-rise buildings. Additional product applications include public halls, ships, motor vehicles, and certain industrial installations requiring special atmospheric conditions (e.g., in the textile, paper, or food industries). Unitary air-conditioners may be floor standing, wall mounted, ceiling suspended, or roof mounted. In 1992, unitary air-conditioning equipment and parts were the largest single product category in terms of value of U.S. producers' shipments, accounting for approximately 44 percent of all products covered in this summary.

Other major types of air-conditioning equipment and parts include room air-conditioners and liquid chilling units. Room air-conditioners are self-contained units designed to cool a single room. They may be installed in a window, or through a wall opening. Room air-conditioners are used in single-family homes, apartments, motels, individual offices, and small shops. Liquid chilling units are one of the components of large cooling systems. They compress large volumes of refrigerant gas, which is

¹ The Air-Conditioning and Refrigeration Institute (ARI) is the principal U.S. trade association for this industry. ARI members produce more than 95 percent of central air-conditioning and commercial refrigeration equipment in the United States. This summary does not contain information on commercial refrigerators or freezers, which are covered in the summary on Commercial Machinery.

circulated through a condenser to cool water. The chilled water is then pumped through coils over which air is passed to provide cool air to the conditioned space. Most liquid chilling units utilize compressors of centrifugal, reciprocating, or rotating screw design. Liquid chilling units are used primarily in the air-conditioning of large buildings such as high-rise office buildings, hospitals, public buildings, hotels, etc. They are also often used to provide cooling for manufacturing processes that require controlled environments.²

Compressors are devices that increase the pressure of a gas, vapor, or mixture of gases and vapors by reducing the specific volume of the gas or vapor in a chamber. Compressors are classified as reciprocating, rotary, jet centrifugal, or axial-flow devices, depending upon the mechanical means used to compress the gas and upon how the mechanical elements of each compressor type acts on the coolant (e.g., freon) to be compressed. They range in size from fractional horsepower units to 3,000 horsepower centrifugal chilling units. In 1992, compressors of all types accounted for an estimated 38 percent of total U.S. producers' shipments of air-conditioning equipment and parts.

Fans and blowers are used in a variety of applications from ventilating commercial and industrial facilities to controlling air pollution. Principal types of fans and blowers include oscillating fans, ceiling fans, window fans, automotive blowers, and floor and box fans.

U.S. INDUSTRY PROFILE

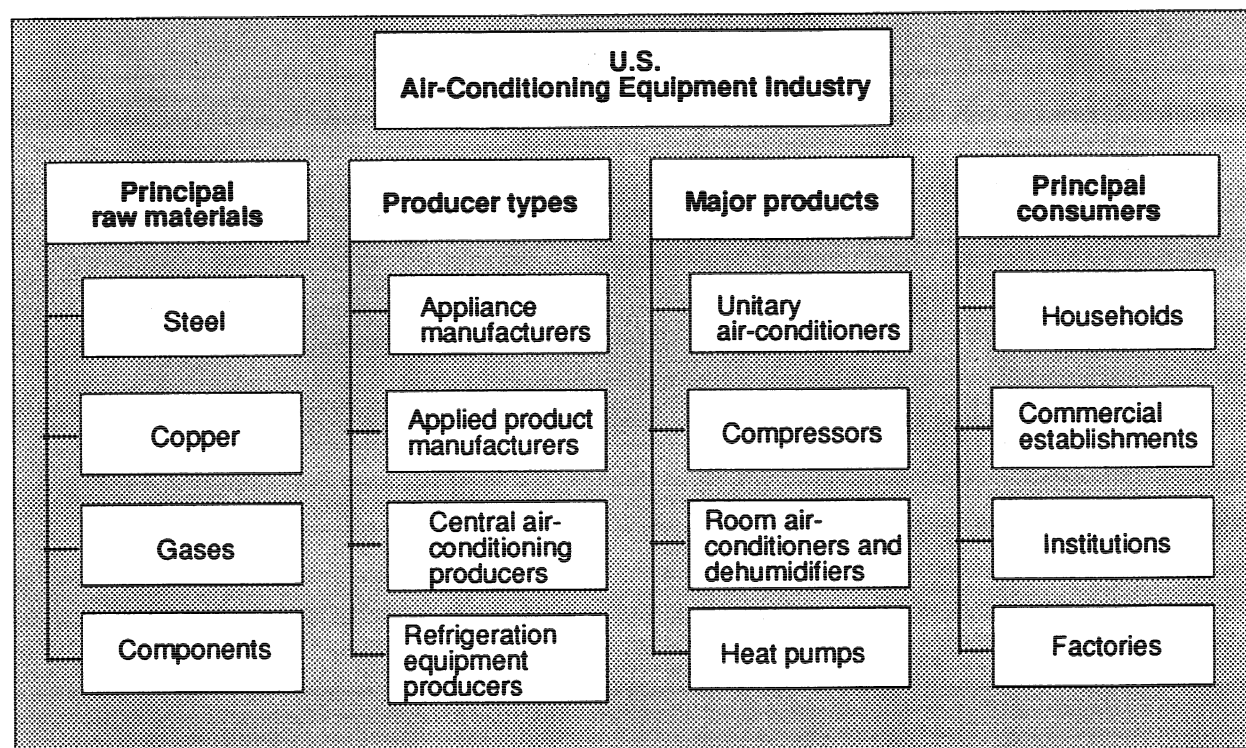
Industry Structure³

The principal raw materials, producer types, major products, and principal consumers of the U.S. air-conditioning equipment and parts industry are shown in figure 1. In 1992, the U.S. industry producing air-conditioning equipment and parts consisted of approximately 355 firms, employing an estimated 174,200 persons. In addition, a number of firms that produce air-conditioning machines also produce refrigeration and heating equipment, or other components. The industry is largely concentrated in Ohio, Michigan, Wisconsin, New York, Pennsylvania, and Texas. In recent years, however, numerous firms

² "Statistical Profile of the Air-Conditioning, Refrigeration, and Heating Industry", The Air-Conditioning and Refrigeration Institute, June 1991, p. 2.

³ Air-conditioning equipment and parts are included as part of Standard Industrial Classification (SIC) 3585 (pt.), Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment. Other major product groups include SIC 3563 (pt.), Air and Gas Compressors, and SIC 3564 (pt.), Industrial and Commercial Fans and Blowers and Air Purification Equipment.

Figure 1
U.S. air-conditioning equipment and parts industry: Principal raw materials, producer types, major products, and principal consumers



Source: Staff of the U.S. International Trade Commission.

have relocated their production facilities to the Southeast and Southwest regions of the United States in an effort to take advantage of lower labor rates, lower state taxes, and other related benefits provided in these areas. A few of the principal U.S. air-conditioning equipment and parts producers are displayed in figure 2.

The U.S. industry producing air-conditioning equipment, and parts is predominately comprised of small- and medium-sized companies. However, the top five air-conditioning equipment producers account for an estimated 77 percent of total U.S. producers' shipments. Several of the largest firms in the industry are multinational firms that distribute their products globally through direct export, wholly owned foreign subsidiaries, or various licensing arrangements (see figure 3).

In recent years, the industry has undergone major structural changes as the result of mergers, acquisitions, and joint ventures with foreign firms. Major U.S. producers have entered into joint ventures with foreign firms in an effort to improve their competitive position. According to U.S. industry sources, nearly all major U.S. producers of these products are currently buying a substantial share of high-quality, low-cost, foreign components for

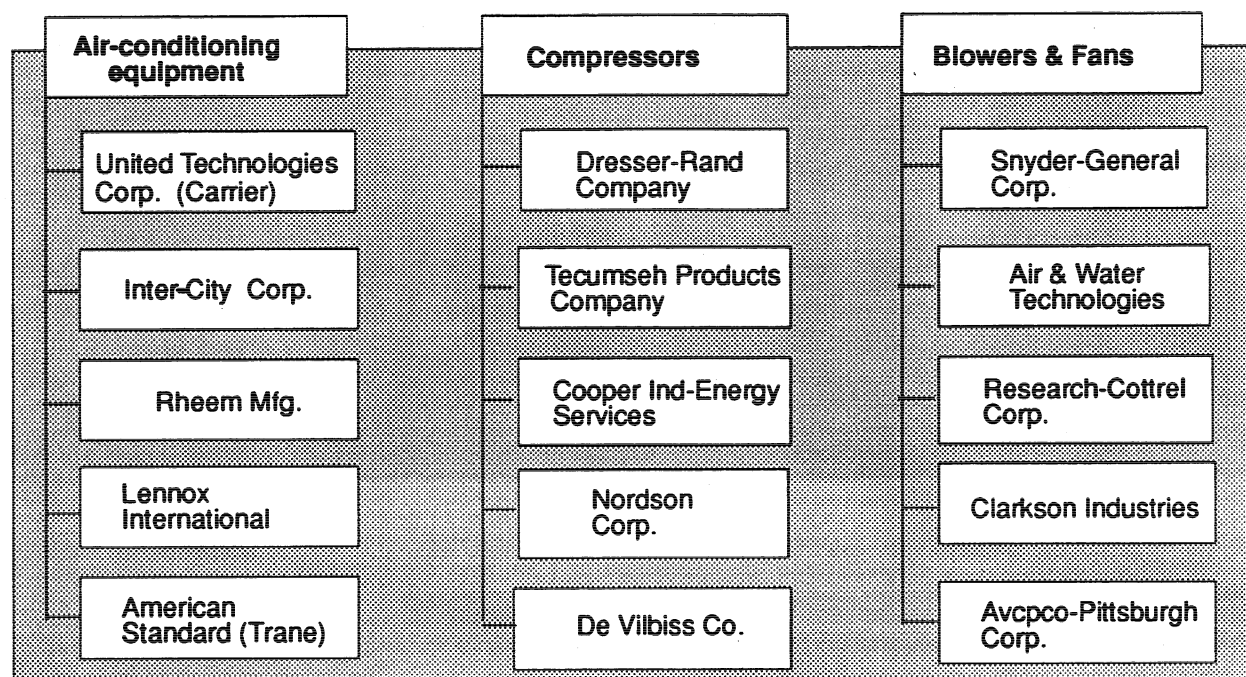
inclusion in their products. The increased purchase of foreign components by U.S. producers has enabled the industry to increase its profitability and to better compete with foreign producers. The subject industry is capital intensive and highly automated.

Largely because of increasing foreign competition, the number of U.S. firms producing air-conditioning equipment and parts decreased from 763 firms in 1988 to 355 in 1992. U.S. employment also decreased from approximately 183,600 in 1988 to 174,200 in 1992, having peaked at 188,400 workers in 1989.⁴ This latter decrease occurred partially as a result of industry automation measures implemented to enhance productivity and price competitiveness.⁵ Average hourly earnings for production workers for the three major groups covered by this summary amounted to \$11.29 per hour in 1992 (table 1). The industry's relocation of labor-intensive operations to Mexico, Taiwan, and other emerging supplier countries was an additional factor leading to a decrease in employment.

⁴ Employment data are overstated; figures include employees producing commercial refrigeration equipment, certain air purification equipment, and certain spraying equipment.

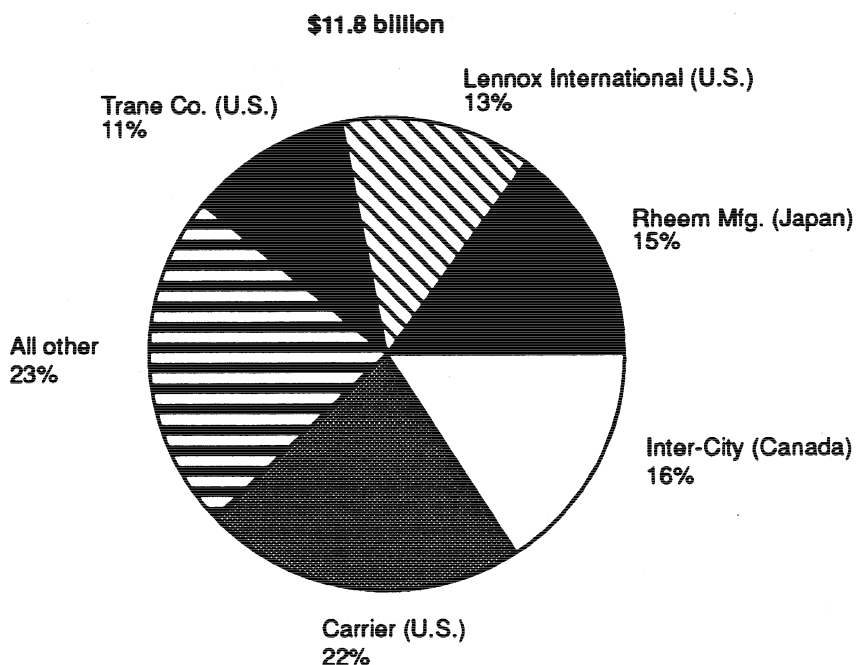
⁵ U.S. Department of Commerce, *Annual Survey of Manufacturers*, 1990 ed., pp. 22-3-22-5.

Figure 2
Major U.S. producers of air-conditioning equipment and parts



Source: Staff of the U.S. International Trade Commission.

Figure 3
U.S. market share of leading air-conditioning and refrigeration producers in 1992



Source: Appliance Manufacturer, 1992.

Table 1
Air-conditioning equipment and parts: Number of employees, production workers, and
production workers' average hourly earnings, by applicable SIC Industries, 1988-92

(In thousands, except as noted)

SIC/Item	1988	1989	1990	1991	1992
SIC 3563, Air and Gas Compressors:¹					
All employees	22.9	24.6	26.6	25.3	25.3
Production workers	13.4	14.0	14.3	13.8	13.9
Production workers' average hourly earnings (dollars)	10.52	10.72	11.66	12.06	12.16
SIC 3564, Industrial and Commercial Fans and Blowers and Air Purification Equipment:²					
All employees	30.8	31.6	32.0	31.1	30.9
Production workers	19.9	21.2	21.6	21.0	21.0
Production workers' average hourly earnings (dollars)	9.41	9.70	9.99	10.17	10.31
SIC 3585, Air-Conditioning and Warm Air Heating Equipment and Commercial and Industrial Refrigeration Equipment:^{3 4}					
All employees	129.9	132.2	121.2	115.0	118.0
Production workers	96.0	98.4	88.2	82.6	86.6
Production workers' average hourly earnings (dollars)	10.67	10.76	11.10	11.30	11.40
Total					
All employees	183.6	188.4	178.8	171.4	174.2
Production workers	129.3	160.6	124.3	117.4	121.5
Production workers' average hourly earnings (dollars)	10.46	10.59	10.97	11.19	11.29

¹ Includes industrial spraying equipment.

² Includes air purification equipment.

³ Includes refrigeration and warm air heating equipment.

⁴ Employment and hourly earnings data may be overstated because figures include certain commercial refrigeration equipment.

Source: Compiled by the staff of the U.S. International Trade Commission from data published by the U.S. Department of Labor, Bureau of Labor Statistics.

To remain competitive with foreign producers, the U.S. industry invested an estimated \$1.1 billion in research and development in 1989 (the most recent year for which data are available). The principal research and development objectives for the industry are centered on meeting customers needs in such internationally competitive areas as product development, material process advancements, and manufacturing technology. According to industry sources, Japan's corporate research and development growth rate in 1988 was three times as great as that of competing firms in the United States.⁶

Capacity utilization has gradually decreased in recent years from 83 percent in 1988 to an estimated 76 percent in 1992. Traditionally, the industry's performance has been heavily influenced by new construction, weather (principally temperature), and

building and renovation projects. The replacement and renovation market in the United States and abroad accounted for more than 50 percent of new equipment manufactured in 1992 and has been responsible for most of the growth in the industry over the past few years. The construction of residential and commercial space over the past few years has declined because of a slowdown in the U.S. economy and increased construction costs. Homeowners have increasingly opted to replace existing equipment that has become defective with more energy-efficient products.⁷

In 1992, an estimated 85 firms operating 158 establishments produced compressors and parts. Approximately 51 firms produced air and gas compressors, and another 34 companies manufactured air-conditioning and refrigeration compressors. A few of the large producers of air-conditioning compressors

⁶ "Spending on Tomorrow Today," *U.S. News and World Report*, July 22, 1991, p. 45.

⁷ U.S. Department of Commerce, *U.S. Industrial Outlook 1990*, pp. 22-3-22-5.

also manufactured other types of refrigeration and peripheral components. Significant producers of all types of compressors include the Dresser-Rand Co., Tecumseh Products Co., Cooper Industries, Nordson Corp., and De Vilbiss Co. Additionally, the top four firms collectively accounted for approximately 50 percent of total producers' shipments in 1992. Major producing States are Texas, California, Pennsylvania, Ohio, and Illinois.

During 1988-92, the estimated total number of workers employed by firms engaged in the manufacture of compressors increased from 22,900 to 25,300 employees (table 1). The workers producing these components range from low-skilled, assembly-line workers to highly skilled machinists operating metalworking machine tools. However, industry consolidation of compressor manufacturing facilities is likely to continue as producers attempt to reduce overhead costs by investing in computer-aided design and computer-aided manufacturing systems (CAD/CAM) and advanced metalworking and casting equipment. Additionally, mergers and acquisitions will likely increase as compressor producers pursue rapid expansion of their product lines and enter into new global industrial markets.

The major producers of fans and blowers include Snyder General Corp., Air-Water Technologies (Research Cottrell), Clarkson Industries, and Avcpco-Pittsburgh Corp. These five producers of fans and blowers together accounted for an estimated 45 percent of total shipments in 1992. Major producing States were California, Texas, Illinois, Pennsylvania, and New York.⁸

The U.S. fans and blowers industry is mature and moderately concentrated, with an estimated 52 producers employing a total of 30,900 workers in 1992. The bulk of these producers manufacture industrial fans and blowers, with fewer than 10 producers concentrating on the production of household fans. The fans and blowers industry accounted for the largest share of imported products of articles covered in this summary in 1992.

Despite a number of mergers and the slow growth in shipments, neither employment nor the basic structure of the fans and blowers industry changed appreciably during 1988-92. For example, employment in the industry increased modestly from 30,800 to 30,900 workers. Increased spending by electric utilities to comply with the Clean Air Act Amendments of 1990 and related state regulations, coupled with strong export demand, kept industry shipments and employment from declining during the period. However, industry consolidation is viewed as likely to accelerate in an effort to curtail rising labor costs and declining capacity utilization, and to improve the position of major producers in rapidly developing global markets. Two-thirds of all employees in this

industry are production workers, performing primarily repetitive assembly operations.

Although the United States is the world's largest producer of all but two of the products covered in the summary (room air-conditioners and fractional horsepower refrigeration compressors), numerous countries are emerging as major producers and competitors. In 1992, Japan accounted for 28 percent of all U.S. imports of these products. Other significant foreign suppliers included Taiwan, Mexico, and the EU (principally Germany and the United Kingdom). Suppliers in these countries have increased their production as a direct result of U.S. technology transfers via licensing arrangements, U.S. direct investment, and various joint-venture agreements with U.S. firms. Economic growth in these nations has stimulated manufacturing both for home-market consumption and for export. The principal factors that influence U.S. firms to locate abroad include the foreign market's political-economic climate, the availability of low-cost labor, the development of the transportation infrastructure, and the accessibility of raw materials. Despite the gradual increase in U.S. production capacity in recent years, foreign capacity still exceeds that of the United States.

During the next 10 years, the U.S. industry producing air-conditioning equipment and parts is expected to undergo more structural changes.⁹ Industry consolidation may be necessary as a result of accelerated advances in composite materials, production technologies (particularly refrigeration compressor manufacturing), and the requirement to replace chlorofluorocarbon (CFC) gases.¹⁰ U.S. producers may shift a larger share of production to high-value, intermediate-technology products (e.g. energy efficient compressors); low-profit margin products such as room air-conditioners and CFC piston-driven reciprocating compressors are likely to be produced in developing countries.

The leading U.S. air-conditioning equipment and parts producers typically employ the latest technology in product designs. In recent years, U.S. air-conditioner producers have introduced technologically advanced scroll compressors that are highly energy efficient and make use of non-CFC-related refrigerants. State-of-the-art compressor technology was made possible by extensive applications of CAD/CAM. The U.S. air-conditioning industry, along with several large Japanese firms, are the world's only producers of scroll compressors that are typically used in small air-conditioning machines and heat pumps. However,

⁹ "Rapid Changes in Compressor Designs Challenge Industry," *Air-Conditioning & Refrigeration News*, Aug. 8, 1988, p. 12.

¹⁰ Chlorofluorocarbons (CFCs) are any of the various gaseous compounds of carbon, hydrogen, chlorine, and fluorine used especially as refrigerants in compressors for household appliances, automotive air-conditioning, and all types of air-conditioning and refrigeration equipment.

⁸ *Ward's 1992 Business Directory of U.S. Private and Public Companies*, Volumes 1 and 2.

Japan dominates the production of low-sound level rotary compressor technology that is found in household refrigerators.¹¹

The recent movement toward the global banning of the production by industrialized countries of all CFC refrigerants by the year 2000 could dramatically affect all leading producers of air-conditioning and components products over the next 5 to 10 years. The U.S. Government has mandated that all domestic CFC production be eliminated by 1995. Presently, the United States accounts for about one third of worldwide use of CFCs in air-conditioning equipment and parts.¹²

Marketing Methods and Technology Trends

The U.S. market for air-conditioning equipment and parts is separated into the new equipment market, the after or replacement market, and the add-on market. The new equipment market consists of individuals, builders of residential and commercial property, and firms engaged in air-conditioning related services and manufacturing. Service firms, such as commercial airlines, and the Federal state and local Governments also purchase air-conditioning equipment. Aircraft and motor-vehicle manufacturers frequently purchase fans, blowers, compressors, and air-conditioning equipment and related parts. Engineering and architectural firms, although not end users, often are responsible for determining the specifications for construction and consulting projects that include these products. The demand for new air-conditioning equipment, compressors, fans and blowers, and parts is cyclical, fluctuating with new construction activity, prevailing interest rates, and the cost of energy.

Products sold in the aftermarket are articles that are not included in the original purchase (e.g., automobile air-conditioners that were not factory-installed units). Over the past decade, automobile aftermarket demand has decreased substantially because the number of factory-installed units for both domestic and foreign automobiles and off-highway vehicles (e.g., harvesting combines) has increased substantially. In 1992, nearly 91 percent of all automobile and off-highway vehicles were equipped with factory-installed air-conditioning units.

According to industry sources, the replacement market accounted for an estimated 50 percent of the U.S. air-conditioning market in 1992. The replacement market is affected by the age and failure rate of equipment in place and the desire to reduce operating costs through the use of more efficient products.¹³

¹¹ USITC staff interview with officials of The Air-Conditioning and Refrigeration Institute, Apr. 18, 1992.

¹² "The Chemistry of Air-Conditioning & Refrigeration Is Changing," The Air-Conditioning and Refrigeration Institute, Revised 1991, p. 3.

¹³ "The Replacement Market," *The Air-Conditioning, Heating, and Refrigeration News Statistical Panorama* '92, Mar. 30, 1992, p. 39.

Additionally, quality, reliability, and service frequently figure as the major reasons in the replacement market for repeat purchasers of the same brand (e.g., electric heat pumps). Furthermore, industry sources indicate that consumers may typically "add-on" supplemental components (e.g., energy-efficient warm-air furnace) to complement replacement equipment, such as central air-conditioning or electric heat pumps.¹⁴

Consumer Characteristics and Factors Affecting Demand

In numerous instances, the products covered in this summary can substitute for each other. For example, heat pumps can be used to replace or complement warm-air furnaces and ductless split air-conditioners can be employed to refurbish central air-conditioning in older buildings. According to a recent U.S. Department of Energy study, one-third of the new households in America presently utilize heat pumps as either the primary source of home heating and cooling, or as a supplement to other home heating sources, such as warm-air furnaces and wood stoves.¹⁵

The residential housing market accounted for an estimated 60 percent of all U.S. air-conditioning equipment and parts shipments in 1992. According to the National Home Builders Association, there were approximately 100 million residential housing units in the United States in 1991. Factors that affect demand for the majority of these products vary by region of the country.

Environmental Regulations

In recent years there have been heightened concerns that chlorofluorocarbons (CFCs), may be destroying the earth's ozone layer and contributing to global warming. The United States Government became a signatory to the Montreal Protocol Treaty in 1987 and the Montreal Protocol Amendment in 1990. The treaty calls for the complete elimination of worldwide CFC production by the year 1995, except for developing countries which have an additional 10-years to comply with the accord for countries that are not parties to the Montreal Protocol, restrictions are in effect for bulk CFC imports and exports into the United States.

The U.S. Environmental Protection Agency (EPA) further mandated that all U.S. CFC production be eliminated by the end of 1995, except for a few essential applications. In addition, the U.S. Congress has imposed a staged tax ranging from \$1.37 to \$3.35 to be levied annually on each pound of CFCs used, effective January 1, 1990, through 1995, and an additional assessment of 45 cents a pound each year thereafter. Nevertheless, the EPA had issued regulations in 1988 requiring that U.S. consumption of CFCs be frozen at the 1986 production level, and a staged 70-percent reduction from 1986 production levels also be completed by the end of 1995.

¹⁴ Ibid., p. 38.

¹⁵ "A Reversible Air-Conditioner, Heat Pump Warms and Cools," *New York Times*, July 27, 1991, p. B2.

Commercial air-conditioning liquid chilling units, mobile air-conditioning systems, and water coolers are the products most likely to be affected by the phaseout of CFCs. Two alternative chemicals—hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) have been endorsed by manufacturers and supported by United Nations Environment Program (UNEP) as CFC substitutes. Preliminary studies on these substitutes found significant environmental advantages over using CFCs, most importantly the absence of any significant contribution to stratospheric ozone depletion.¹⁶ However, both HCFCs and HFCs are regarded by U.S. industry sources to be an interim solution to the long-term dilemma facing this industry of total banning of all CFC substitutes.

The Montreal Protocol Treaty was amended in November, 1992, to limit the amount of HCFC consumption beginning in 1996. The HCFC consumption freeze is designed to ultimately eliminate worldwide consumption of these chemicals by the year 2030. Additionally, the amended Montreal Protocol treaty encourages the recovery, recycling, and reclaiming of controlled substances, such as HCFCs, used in nearly all unitary air-conditioning equipment.¹⁷

Effective July 1, 1992, the EPA began the implementation of the regulatory provisions of Title VI of the Clean Air Act Amendment of 1990. The Clean Air Act amendment will prohibit intentional venting of CFCs and HCFCs during service, repair, or disposal of any air-conditioning or refrigeration equipment. The controls cover the sale of refrigerants and the disposition of recovered refrigerants, as well as mandatory certification of recovery/recycling equipment, technicians, and the purity of refrigerant recovered, reclaimed, and resold.

The search for alternative refrigerants (HCFCs and HFCs) to replace CFCs has spawned international cooperation by various producers associated with the air-conditioning industry. Chemical manufacturers are cooperating in toxicity testing of alternative refrigerants. Equipment manufacturers are also cooperating to assess the material effects of potential alternative refrigerants. Equipment manufacturers from the United States, Canada, the EU, and Japan, the major producing nations, have joined forces to perform a preliminary evaluation of possible alternatives for HCFC-22, a refrigerant widely used in air-conditioning and refrigeration equipment. Test results are anticipated in 1994.

The search for alternative refrigerant replacements for CFC gases is regarded as one of the greatest challenges the air-conditioning industry has ever faced. Efficiency, toxicity, safety, and cost are all major factors facing producers worldwide. However, several

major manufacturers introduced several products in 1992 that contain few, if any, ozone depleting refrigerants.¹⁸

FOREIGN INDUSTRY PROFILE

The air-conditioning equipment and parts industry is mature, and has entered an era of full-scale internationalization in which firms' long term survival will depend heavily on their success abroad in both production and marketing capabilities. The drive for export markets and expanded worldwide market share has prompted major air-conditioning equipment and parts firms in the United States to seek arrangements with foreign firms in numerous countries, such as joint-ventures, and distribution and licensing agreements. Moreover, major worldwide producers have generally established dealers and/or manufacturing subsidiaries in each major global market. Intense price and environmental technology competition among the principal manufacturing countries—the United States and Japan—has resulted in some instances of international cooperation by major firms, such as Toshiba Corp. and General Electric Co., in such areas as production of energy efficient air-conditioning equipment and parts. Additionally, a consortium of Japanese and U.S. companies has been formed to conduct research and development on production of environmentally safe air-conditioning equipment and components (e.g., compressors).

According to U.S. industry sources, the United States is expected to maintain its position as a leading global producer of air-conditioning equipment and parts throughout 1995. During 1990, however, the U.S. industry was matched in worldwide sales by Japan, currently the only other significant worldwide producer. Presently, U.S. and Japanese producers of these products each account for 40 percent of air-conditioning equipment parts and sales worldwide. The remaining 20 percent of market share for these products is accounted for by the rest of the world.¹⁹

The industry producing air-conditioning equipment in Japan is highly concentrated, with six companies (Matsushita, Hitachi, Toshiba, Sanyo, Daikin, and Mitsui), accounting for an estimated 90 percent of total domestic production. In 1992, Japan's production of air-conditioning equipment and parts was valued at an estimated \$11.6 billion. Of the total output, 40 percent was exported. The largest export market regions for Japanese air-conditioning equipment and parts are North America (41 percent), Asia (20 percent), the Middle East (17 percent), Europe (16 percent), and Latin America (6 percent).

Japanese air-conditioning products typically emphasize superior product quality and low operating sound levels. These features have been heavily influenced by the relatively high energy costs in Japan,

¹⁶ U.S. Department of Commerce, *U.S. Industrial Outlook 1993*, pp. 17-3-17-4.

¹⁷ "Montreal Protocol Revisions Provide Incentives," *Koldfax*, Dec., 1992, pp. 1-2.

¹⁸ Ibid.

¹⁹ USITC staff interview with officials of The Air-Conditioning and Refrigeration Institute, May 20, 1992.

crowded Japanese living conditions, and the Japanese philosophy that products operating in one's home should not disturb others. Japanese manufacturers stress the use of electronics and borrowing and adapting technology employed in other electronics-based industries. In addition, Japanese producers have incorporated relatively new compressor technologies into their equipment, such as rotary and scroll compressors (which utilize fewer operating parts, are quieter, and are more efficient to operate than conventional compressors) and have introduced new materials into their components.²⁰ U.S. industry sources indicate that major U.S. producers have started to narrow the sound-level gaps in compressor technology. Presently, U.S.-produced home air-conditioners make one-fourth the noise of traditional models that are greater than 10 years old.

U.S. TRADE MEASURES

Tariff Measures

General column 1 rates of duty for imports of air-conditioning equipment and parts on January 1, 1993, ranged from free to a high of 4.7 percent ad valorem (table 2). See Appendix A for an explanation of tariff and trade agreement terms. The trade-weighted average rate of duty for air-conditioning products was 3.25 percent ad valorem in 1992, down from 4.5 percent in 1988. However, imports of air-conditioning equipment and parts, including compressors, fans, and blowers, generally enter the United States duty free under the Generalized System of Preferences and the United States-Israel Free Trade Area Implementation Act of 1985. Imports enter at a reduced rate under the United States-Canada Free Trade Agreement Implementation Act of 1988 and under HTS subheadings 9802.00.60 and 9802.00.80. U.S. duties on imports of most air-conditioning equipment and parts (including fans and blowers and compressors) from Canada will be phased out by the end of 1993; the remaining tariffs will be eliminated by 1998.

The North American Free Trade Agreement (NAFTA), as implemented by the North American Free Trade Agreement Implementation Act (Public Law 103-182, approved Dec. 8, 1993), provides for the phaseout of U.S. duties over a 5- to 10-year period beginning January 1, 1994 on air-conditioning equipment and parts imported from Mexico. Mexico is obligated to phase out its duties on imports of such goods from the United States over a 5- to 15-year period. The NAFTA became effective for both the United States and Mexico on January 1, 1994.

The recently completed (December 1993) GATT Uruguay Round of trade negotiations may result in further reductions in U.S. and foreign duties on the

²⁰ *The Competitive Advantage of Nations*, Michael E. Porter, The Free Press, 1990, pp. 89-90.

articles covered by this summary. The Uruguay Round schedule of U.S. concessions was not available when this summary was prepared.

Nontariff Measures

U.S. industry sources indicate that there are no known U.S. nontariff barriers to trade in air-conditioning equipment and parts.

U.S. Government Trade-Related Investigations

On May 31, 1991, the U.S. International Trade Commission, at the request of Lasko Metal Products Inc., instituted an antidumping duty investigation (No. 731-TA-473) involving imports of certain electric fans (HTS subheading 8414.51.00) from the People's Republic of China (China) and allegedly sold in the United States at less than fair value (LTFV).

Subsequently, the U.S. Department of Commerce determined that certain electric fans were being sold in the United States at LTFV. On December 2, 1991, the International Trade Commission determined that an industry in the United States was being materially injured by reason of imports from China of certain electric fans that had been found by Commerce to be sold in the United States at LTFV.

FOREIGN TRADE MEASURES

Tariff Measures

Tariffs on U.S. exports of air-conditioning equipment and related parts to major foreign markets are generally higher than U.S. tariff rates. Tariff rates on U.S. exports to Canada range from free for certain articles (vacuum pumps, parts of fans and ventilating or recycling hoods, certain air-conditioning machines incorporating a refrigerating unit, and air compressors on a wheeled chassis for towing), to a maximum rate of 8.7 percent ad valorem for electric fans, not exceeding 125 watts.²¹ Canadian duties on imports of air-conditioning equipment and parts from the United States are being reduced systematically and are scheduled to be eliminated by January 1, 1998.

Nearly all air-conditioning equipment and parts entering Mexico are subject to tariff rates ranging from 10 to 20 percent ad valorem. The only exceptions are "special" duty rates applicable to Latin American Integration Association (LAIA) countries. The LAIA rates are not standardized for all member countries and vary by country within a commodity classification.²² Mexican tariff duties on imports of air-conditioning equipment and parts from the United States and

²¹ According to U.S. Department of Commerce's Canada country desk officers and relevant pages from the Canadian tariff schedules.

²² According to U.S. Department of Commerce's Mexico country desk officers and relevant pages from the Mexican tariff schedules.

Table 2

Air-conditioning equipment and parts: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1993; U.S. exports, 1992; and U.S. Imports, 1992

HTS subheading	Description	Col. 1 rate of duty as of Jan. 1, 1993		U.S. exports, 1992	U.S. Imports, 1992
		General	Special ¹		
Million dollars					
8414.10.00	Vacuum pumps	3.7%	Free (A,B,C,CA,E,IL,J)	59	121
8414.20.00	Hand- or foot-operated air pumps	3.7%	Free (A,B,C,CA,E,IL,J)	6	27
8414.30.40	Compressors of a kind used in refrigerating equipment (including air-conditioning), not exceeding 1/4 horsepower	3.4%	Free (A,B,C,CA,E,IL,J)	76	173
8414.30.80	Compressors of a kind used in refrigerating equipment (including air-conditioning), exceeding 1/4 horsepower	3.4%	Free (A,B,C,CA,E,IL,J)	476	449
8414.40.00	Air compressors mounted on a wheeled chassis for towing	3.4%	Free (A,CA,E,IL,J)	63	7
8414.51.00 ²	All types of electric fans, with self-contained electric motors of an output not exceeding 125 watts	4.7%	Free (A,C,E,IL,J) 2.3% (CA)	33	557
8414.59.10	Blowers for pipe organs	Free		13	48
8414.59.80	Other fans and blowers, exceeding 125 watts	4.7%	Free (A,B,C,CA,E,IL,J)	110	203
8414.60.00	Hoods having a maximum horizontal side, not exceeding 120 cm	4.7%	Free (A,B,E,IL,J) 2.3% (CA)	10	2
8414.80.10	Certain air compressors, including portable	3.4%	Free (A,B,C,CA,E,IL,J)	183	136
8414.80.20	All other compressors, other than those in 8414.30.40, 8414.30.80, 8414.40.00, and 8414.80.10	3.4%	Free (A,B,C,CA,E,IL,J)	331	56
8414.80.90	Other, n.e.s.i	3.7%	Free (A,B,C,CA,E,IL,J)	83	30
8414.90.10	Parts of fans including blowing and ventilating or recycling hoods	4.7%	Free (A,B,C,CA,E,IL,J)	51	114
8414.90.20	Parts of compressors	3.4%	Free (A,B,C,CA,E,IL,J)	332	175
8414.90.90	Parts, n.e.s.i	3.7%	Free (A,B,C,CA,E,IL,J)	94	54
8415.10.00	Window or wall-type air-conditioning machines, self-contained	2.2%	Free (A,E,IL,J) 1.1% (CA)	93	135
8415.81.00 ³	Other air-conditioning machines, incorporating a refrigerating unit and a valve for reversal of the cooling/heat cycle	2.2%	Free (A,B,C,E,IL,J) 1.1% (CA)	109	68
8415.82.00 ⁴	Other air-conditioning machines, incorporating a refrigerating unit, n.e.s.i	2.2%	Free (A*,B,C,CA,E,IL,J)	351	114
8415.83.00	Other air-conditioning machines, not incorporating a refrigerating unit	2.2%	Free (A,B,C,CA,E,IL,J)	263	60
8415.90.00 ³	Parts of air-conditioning machines	2.2%	Free (A*,B,C,E,IL,J) 1.1% (CA)	798	295

¹ Programs under which special tariff treatment may be provided, and the corresponding symbols for such programs as they are indicated in the "Special" subcolumn, are as follows: Generalized System of Preferences (A*); Automotive Products Trade Act (B); Agreement on Trade in Civil Aircraft (C); United States-Canada Free-Trade Agreement (CA); Caribbean Basin Economic Recovery Act (E*); United States-Israel Free Trade Area (IL); and Andean Trade Preference Act (J)

² See subheading 9905.84.08. Oscillating table fans enter duty free from Canada

³ See subheading 9905.00.00; equipment, originating in the territory of Canada, intended for use in the repair or maintenance of certain motor vehicles subject to accelerated stage rate reductions. See subheading 9905.84.16; parts of air-conditioners of subheading 8415.82.00 for locomotives enter duty free from Canada

⁴ See subheadings 9905.84.08, 9905.84.09, 9905.84.11, and 9905.84.14. Air-conditioners for locomotives enter duty free from Canada.

Source: U.S. exports and imports compiled from official data of the U.S. Department of Commerce.

Canada will be systemically reduced under the North American Free Trade Agreement effective Jan. 1, 1994.

The Korean 1992 general tariff rates for air-conditioning equipment and parts ranged between 11 percent ad valorem and 13 percent ad valorem. Fans and blowers, compressors, and air and vacuum pumps are dutiable at the maximum tariff rate of 13 percent ad valorem; air-conditioning equipment is dutiable at an 11 percent ad valorem tariff rate. Additionally, a 10-percent value added tax (VAT) is levied on all imported products.²³

Nearly all air-conditioning equipment and related parts entering Saudi Arabia are subject to a rate of 12 percent ad valorem. The only exception being window air-conditioners, which are subject to a 20 percent ad valorem tariff.²⁴

Nontariff Measures

Since May 1990, China has required quality import licenses for imports of air-conditioning equipment and refrigeration compressors. These import licenses reportedly require that imports into China meet more significant standards than those applied to similar domestically produced products. State planning, rather than tariffs, plays a major role in regulating trade with China.²⁵

U.S. MARKET

Consumption

Apparent U.S. consumption of air-conditioning equipment and parts decreased from \$13.5 billion in

²³ According to U.S. Department of Commerce's Korean country desk office.

²⁴ According to U.S. Department of Commerce's Saudi Arabia country desk officers and relevant pages of the Saudi Arabian BTN based tariff schedule.

²⁵ Office of the United States Trade Representative, 1992 *National Trade Estimate Report on Foreign Trade Barriers*, pp. 43-44.

1988 to \$11.8 billion in 1992, or by 13 percent (table 3). Historically, domestic households and commercial and institutional establishments have accounted for the bulk of apparent consumption of these products. The most significant factors that influence U.S. consumption of these products are commercial and residential construction, weather patterns, and the age of existing equipment. These factors have traditionally been responsible for the robust market demand for air-conditioning equipment and parts covered in this report. Import penetration for these products (table 3) increased from 20.8 percent in 1988 to 23.9 percent in 1992. The increase in import penetration may be partially attributable to rising demand for imported, household fans and blowers and air-conditioning equipment parts, particularly refrigeration compressors used in household refrigerators. During 1993-95, demand for U.S. air-conditioning equipment and parts is expected to grow slowly (projected at 2.6 percent annually) as a result of a slowdown in the national economy, coupled with continued sluggishness in residential and commercial construction, following problems experienced in these industries during the 1980's and early 1990's. Environmental cost factors associated with this industry, such as federally mandated phaseouts of refrigerants and reclamation of CFCs by the end of 1995, are also likely to have a significant impact on this industry.²⁶

There are relatively few differences between brands and consumer purchasing decisions for air-conditioning equipment are primarily based on price. A difference of only a few dollars per unit between competing brands may typically determine a sale. The quality and performance of most products (e.g., window air-conditioners) covered here have been standardized through years of maturing product technology. There are a few product applications, however, such as in the production of rotary and scroll compressors, that quality and design specifications provide certain foreign producers with technological advantages. Because of recent global concern over

²⁶ U.S. Department of Commerce, *U.S. Industrial Outlook 1990*, p. 20-4.

Table 3
Air-conditioning equipment and parts: U.S. producers' shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, 1988-92

Year	U.S. producers' shipments	U.S. Exports	U.S. Imports	Apparent U.S. consumption	Ratio of Imports to consumption
	Million dollars				Percent
1988	12,817	2,111	2,807	13,513	20.8
1989	13,525	2,544	3,085	14,066	21.9
1990	13,187	3,050	2,892	13,029	22.2
1991	12,264	3,218	2,668	11,714	22.8
1992	12,509	3,533	2,824	11,800	23.9

¹ Estimated by the staff of the U.S. International Trade Commission.

Source: Compiled from official statistics of the U.S. Department of Commerce, except as noted.

ozone-depleting CFCs, demand for rotary and scroll air-conditioning compressors since 1988 has increased substantially. To date, only a few U.S. and Japanese producers have been able to meet the quality and design specifications for these advanced-technology components.

Shipments

During 1988-92, U.S. producers' shipments of air-conditioning equipment and parts decreased by 2 percent from \$12.8 billion in 1988 to \$12.5 billion in 1992 (table 4). The bulk of U.S. shipments during this period consisted of replacement parts and accessories, and energy efficient air-conditioning equipment. Abnormally hot weather in both 1988 and 1989, coupled with cost cutting installations of new energy-saving equipment by the U.S. grocery industry, and strong export sales allowed U.S. producers of these products to sustain near-record level shipments. The value of domestic shipments (producers' shipments minus exports) declined during 1988-92, falling from \$10.7 billion to \$9.0 billion, whereas U.S. export shipments increased by \$1.4 billion to \$3.5 billion.

In 1992, home construction activity was curtailed, and employment reductions by prominent U.S. corporations, coupled with high consumer debt and industry consolidation, resulted in a decline of domestic shipments of air-conditioning equipment. However, foreign imports of air-conditioning equipment and parts did manage to gain a small but growing import share in selected market niches. The bulk of these imports consisted of both technologically advanced components, such as rotary compressors, and low-technology products (e.g., room air-conditioners) imported by U.S. producers of major household appliances and air-conditioning equipment.

Imports

During 1988-92, U.S. imports of these products averaged nearly \$2.8 billion per year, (see figure 4). The major air-conditioning equipment and parts

imported in 1992 were compressors, fans, and blowers. Together, these three major categories accounted for 71 percent, or approximately \$1.9 billion of total imports in 1992.²⁷ The principal import supplier nations were Japan, Taiwan, Mexico, Germany, China, and Singapore. Since 1988, the only change among major suppliers of these products has been Hong Kong, which has been displaced as a leading supplier country. The curtailment of GSP eligibility, primarily for electric ceiling fans in late 1985, was partially responsible for the decrease in imports from Hong Kong. In recent years, the bulk of electric ceiling fan producers in Hong Kong have opted to relocate production facilities to the PRC, as a result of substantially lower wages.

Canada was the fourth largest supplier of air-conditioning equipment and parts to the United States in 1988. However, implementation of the U.S.-Canada Free-Trade Agreement in 1989 reportedly prompted a number of major U.S. producers to close their operations in Canada and consolidate them in centralized U.S. distribution centers. The slowdown in the U.S. economy in 1991 further diminished Canada's export share for these products.

In recent years, Mexico, China, and Brazil have emerged as significant import suppliers (table 5), primarily of low-cost, low-technology components (e.g., reciprocating compressors) and air-conditioning products, such as window air-conditioners and condensing units. To remain price competitive in international markets, several major U.S. producers have relocated production facilities for certain product lines, such as fractional-horsepower refrigeration compressors and room air-conditioners, to these low-cost production nations. Conversely, a small number of firms (primarily Japanese) have established production facilities for high-value products in the United States in an effort to improve their access to the U.S. market.

²⁷ "The Impact of Exports and Imports,"

Air-conditioning, Heating, and Refrigeration News, Apr. 1, 1991, p. 46.

Table 4
Air-conditioning equipment and parts: U.S. producers' shipments of air-conditioning equipment and parts, by product classes, 1988-92

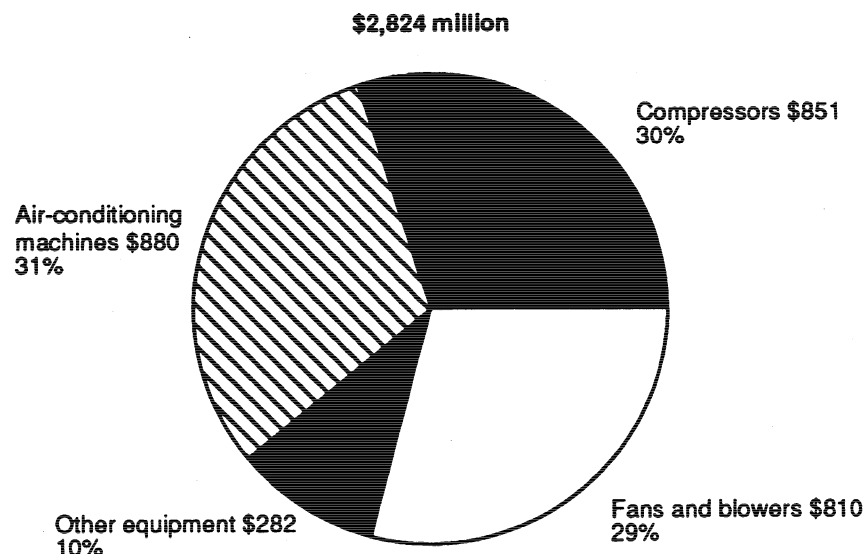
(Million dollars)

Product class	1988	1989	1990	1991	1992 ¹
Air-conditioning machines and parts (including unitary equipment)	5,892	6,291	5,804	5,359	5,466
Fans and blowers	1,985	2,100	2,157	2,006	2,056
Compressors	4,703	4,897	4,983	4,634	4,773
Other equipment and parts	237	237	243	265	214
Total	12,817	13,525	13,187	12,264	12,509

¹ Estimated by the staff of the U.S. International Trade Commission.

Source: U.S. Department of Commerce, Bureau of the Census; *Current Industrial Report Series MA-35M*, 1988-92.

Figure 4
U.S. Imports of air-conditioning equipment and parts, 1992



Source: Compiled from official statistics of the U.S. Department of Commerce.

Table 5
Air-conditioning equipment and parts: U.S. Imports for consumption, by principal sources, 1988-92

(In thousands of dollars)

Source	1988	1989	1990	1991	1992
Japan	(1)	1,001,932	909,479	815,799	787,896
Taiwan	(1)	429,291	338,529	365,097	392,003
Mexico	(1)	228,677	178,219	196,641	267,291
Germany	(1)	164,083	182,212	181,972	189,569
China	(1)	109,559	154,577	137,852	184,971
Canada	(1)	191,500	156,648	143,560	182,788
Singapore	(1)	165,230	162,897	147,635	135,071
Brazil	(1)	138,012	149,306	119,992	108,035
United Kingdom	(1)	97,824	108,566	105,721	101,127
Thailand	(1)	33,024	52,962	60,474	80,659
All other	(1)	526,127	498,964	392,918	394,614
Total	2,807,024	3,085,259	2,892,357	2,667,661	2,824,025

¹ Country-level detail provided only for years in which there are actual trade data under the Harmonized Tariff Schedule of the United States (HTS).

Note.-Because of rounding, figures may not add to totals shown.

Source: Compiled from official statistics of the U.S. Department of Commerce.

Although the import mix of products covered in the summary vary by product type, low-technology, labor-intensive components typically are imported to complement existing U.S. production. However, key components, such as rotary and scroll compressors, may be classified as high-end products and are largely imported from Japan. Other high-end imported

air-conditioning machines include absorption liquid chillers and minisplit air-conditioners from Japan. Because of the high cost of transportation, Japanese absorption chillers have a limited U.S. market. Weight constraints serve to restrict the use of such imported products to a few select industrial applications.

Minisplit room air-conditioners have established only a small but growing market niche in the Southeast region of the United States. These products are typically better suited to warmer climates and provide high-energy efficient cooling as a result of their ability to be zone specific in rooms in a home or office complex. Obstacles involving the servicing of these units, however, have hindered these products from obtaining a larger share of the highly competitive U.S. market. U.S. imports of air-conditioning equipment and parts increased modestly at an average annual growth rate of 2 percent during 1988-92.

In 1992, approximately \$508 million of all imports of air-conditioning equipment and parts entered the United States duty-free. An estimated 57 percent of these imports entered the United States under the Generalized System of Preferences (GSP) and the Caribbean Basin Economic Recovery Act (CBERA). Mexico, Brazil, and Malaysia were the principal GSP suppliers in 1992. In addition, imports of air-conditioning equipment and parts from Canada entered the United States at reduced duties under the United States-Canada Free Trade Implementation Act.

The principal U.S. importers of air-conditioning equipment and parts are merchant wholesalers, retail distributors, original-equipment manufacturers, and major air-conditioning and refrigeration producers. Additionally, there are numerous privately held companies specializing in importing selected product lines.

FOREIGN MARKETS

Foreign Market Profile

U.S. manufacturers of air-conditioning equipment and parts compete abroad principally with producers from Japan and Germany. However, product competition varies depending on the individual type of air-conditioning equipment involved. For instance, Japanese marketing efforts for these products typically combine competitive pricing, long-term financing, and after-market servicing to gain market share. Additionally, Japanese air-conditioning equipment is highly regarded for its low-sound levels, high energy efficiency, and durability. According to industry sources, the Japanese ability to produce efficient, less expensive air-conditioning equipment is attributable to the vertical integration of Japanese firms that minimizes the importing of components, and to adaptable Japanese work rules.²⁸

Japanese firms compete with U.S. manufacturers in select market niche areas, such as refrigeration compressors, gas-fired absorption equipment, room air-conditioners, and nonducted mini-split air-

of room air-conditioners to the Middle East and to the Pacific Basin.

German firms provide the principal competition in markets for fans and blowers, particularly for industrial applications. German firms rival U.S. producers of fans and blowers in major industrialized markets such as the EU, Canada, and Japan. German industrial fans and blowers have been highly regarded for their quality and competitive prices.²⁹

U.S. Exports

Total U.S. exports of air-conditioning equipment and parts reached \$3.5 billion in 1992, up by 13 percent annually from the 1988 level of \$2.1 billion (see table 6). Industry sources indicate that U.S. exports typically represent more than 15 percent of U.S. factory shipments.

U.S. producers export more than 40 categories of equipment, ranging from small-sized, packaged air-conditioning units to centrifugal chiller units weighing several tons. Parts of air-conditioning equipment, refrigerating compressors exceeding 1/4 horsepower, parts of compressors, and miscellaneous types of air-conditioning equipment and apparatus, were the four leading U.S. export items in 1992. These four product categories together accounted for approximately 63 percent of total U.S. exports. The majority of world trade for these categories is accounted for by transnational corporations and their subsidiary firms. U.S.-rationalized production operations associated with the bulk of these products make extensive use of the provisions of HTS subheadings 9806.00.60 and 9806.00.80. U.S. industry sources indicate that, in order to remain internationally price competitive, they plan to increase the use of these two HTS tariff provisions.

At the end of 1992, the United States and Canada completed the fourth year of a 10-year transition period under the U.S.-Canada Free Trade Agreement, during which the two countries will phase out tariffs on air-conditioning equipment and parts. This phaseout of tariffs will most likely increase trade between the two countries. There was a large increase in U.S. exports to Canada in 1992, following a marginal decrease in U.S. exports to Canada in 1991.

The EU's plan to remove all internal tariffs and non-tariffs barriers to trade by yearend 1992 resulted in an increase of exports of these products, particularly exports of air-conditioning components. The prospect of easier trading within the EU has been given an added boost by the unification of Germany. As a result, many U.S. companies have been setting up marketing arrangements in various EU countries.

Although U.S. exports to the EU increased from \$372 million in 1989 to \$414 million in 1992, U.S. export market share accounted for by these countries

²⁸ "Hitachi Plans to Sell Scroll Worldwide; Reciprocating May Phase Out" *The Air-Conditioning, Heating, and Refrigeration News*, Aug. 6, 1990, p. 20.

air-conditioning equipment. In recent years, Japanese manufacturers have surpassed U.S. producers in sales

²⁹ U.S. Department of Commerce, *U.S. Industrial Outlook 1993*, p. 17-5.

Table 6
Air-conditioning equipment and parts: U.S. exports of domestic merchandise, by principal sources, 1988-92

(In thousands of dollars)

Source	1988	1989	1990	1991	1992
Canada	606,791	697,223	967,150	950,741	1,031,617
Mexico	182,290	262,787	285,964	313,206	379,819
Saudi Arabia	147,498	125,243	141,083	186,327	230,046
Venezuela	98,977	59,258	54,675	99,302	147,564
Republic of Korea	52,977	73,976	164,432	183,835	118,150
Japan	51,216	82,804	76,121	88,235	110,788
Taiwan	90,213	144,769	122,409	132,172	106,153
Hong Kong	53,064	61,889	49,727	76,990	106,087
France	57,031	80,464	103,817	95,519	101,838
United Kingdom	72,871	93,307	122,877	89,661	99,959
All other	724,532	862,000	960,871	1,002,022	1,100,486
Total	2,137,459	2,543,719	3,049,126	3,218,009	3,532,508

¹ Country-level detail provided only for years in which there are actual trade data under the Harmonized Tariff Schedule of the United States (HTS).

Source: Compiled from official statistics of the U.S. Department of Commerce.

decreased from 15 percent to 12 percent. A slowdown in economic growth in the EU was largely responsible for the decrease.

The Middle East, the leading U.S. export market for many years, was directly affected by the war with Iraq during the first half of 1991. Even so, exports to that region grew from \$281 million in 1989 to \$569 million in 1992. The Middle East, Eastern Europe, and Mexico are likely to emerge as rapidly growing markets during the next 5 years. The conclusion of the NAFTA agreement between the United States, Canada, and Mexico may also determine how quickly the Mexican market for these products will develop.³⁰ The NAFTA agreement with Mexico will remove existing tariff barriers and make U.S. equipment more affordable for Mexican users beginning in 1994. Industry sources indicate that the Mexican market for air-conditioning equipment and parts amounted to approximately \$160 million in 1992.

U.S. producers of air-conditioning equipment and producers (e.g., fans and blowers) typically market these products abroad through equipment wholesalers, repair shops, and original-equipment manufacturers of complete systems, such as central air-conditioning and refrigeration equipment. However, the bulk of U.S. producers of air-conditioning equipment make use of export management companies, private-label distributors, and foreign manufacturing facilities. Several major compressor firms also market their products through foreign distributors.

U.S. TRADE BALANCE

The U.S. balance of trade in air-conditioning equipment and parts showed a significant improvement during 1988-92, changing from a deficit of \$696 million in 1988 to a surplus of \$709 million in 1992 (table 6). An increase in the value of U.S. exports to Canada, Mexico, Saudi Arabia, and Korea was the major contributing factor leading to the trade surplus during this period. An expanding world market presence by major U.S. producers also contributed to the favorable trade balance. However, the trade deficit with Japan continues to remain high, standing at \$677 million in 1992, down from \$919 million in 1989.

During the next 5 years, an expected increase in per capita income in the Far East, Europe, and Mexico is likely to lead to a double-digit increase in sales for U.S. producers of air-conditioning equipment and parts.³¹ In addition, political and economic changes in foreign countries including the economic integration of the EU and increasing stability in the Middle East, are likely to increase future demand for products produced by the U.S. industry. According to U.S. industry sources, U.S. domestic demand has presently reached maturity and is expected to grow slowly (less than 3 percent annually) during the next 5 years.

³⁰ Ibid.

³¹ U.S. Department of Commerce, *U.S. Industrial Outlook*, Jan. 14, 1994, pp. 17-13-17-14.

Table 7

Air-conditioning equipment and parts: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected country and country group, 1988-92¹

(Million dollars)

Item	1988	1989	1990	1991	1992
U.S. exports of domestic merchandise:					
Canada	(2)	697	967	951	1,032
Japan	(2)	83	76	88	111
Mexico	(2)	263	286	313	380
Taiwan	(2)	145	122	132	106
China	(2)	37	25	34	68
Germany	(2)	75	83	61	56
Saudi Arabia	(2)	125	141	186	230
United Kingdom	(2)	93	123	90	100
Singapore	(2)	50	62	61	66
Korea	(2)	74	164	184	118
All other	(2)	901	999	1,118	1,267
Total	2,111	2,544	3,049	3,218	3,533
EU-12	(2)	372	449	413	414
OPEC	(2)	281	337	418	569
ASEAN	(2)	152	188	184	266
CBERA	(2)	58	58	60	67
Eastern Europe	(2)	3	6	4	3
U.S. imports for consumption:					
Canada	(2)	191	157	144	183
Japan	(2)	1,002	909	816	788
Mexico	(2)	229	178	197	267
Taiwan	(2)	429	339	365	392
China	(2)	110	155	138	185
Germany	(2)	164	182	182	190
Saudi Arabia	(2)	(3)	(3)	(3)	(3)
United Kingdom	(2)	98	109	106	101
Singapore	(2)	165	163	148	135
Korea	(2)	58	92	54	53
All other	(2)	639	609	520	530
Total	2,807	3,085	2,892	2,668	2,824
EU-12	(2)	479	481	445	456
OPEC	(2)	2	2	1	2
ASEAN	(2)	314	311	282	299
CBERA	(2)	(3)	(3)	(3)	(3)
Eastern Europe	(2)	10	8	4	4
U.S. merchandise trade balance:					
Canada	(2)	506	810	807	849
Japan	(2)	-919	-833	-728	-677
Mexico	(2)	34	108	116	113
Taiwan	(2)	-284	-217	-233	-286
Germany	(2)	-73	-130	-104	-117
Korea, Republic of	(2)	-89	-99	-121	-134
United Kingdom	(2)	125	141	186	230
Singapore	(2)	-5	14	-16	-1
Peoples Rep of China	(2)	-115	-101	-87	-69
Saudi Arabia	(2)	16	72	130	65
All other	(2)	262	390	598	737
Total	-696	-541	157	550	709
EU-12	(2)	-107	-32	-32	-42
OPEC	(2)	279	335	417	567
ASEAN	(2)	-162	-123	-98	-33
CBERA	(2)	58	63	60	67
Eastern Europe	(2)	-7	-2	(3)	-1

¹ Import values are based on customs value; export values are based on f.a.s. value, U.S. port of export. U.S. trade with East Germany is included in "Germany" but not "Eastern Europe."

² Country-level detail is provided only for years in which there are actual trade data under the Harmonized Tariff Schedule of the United States (HTS) and the new Schedule B (based on the HTS).

³ Less than \$500,000.

Source: Compiled from official statistics of the U.S. Department of Commerce.

APPENDIX A
EXPLANATION OF TARIFF AND TRADE AGREEMENT TERMS

TARIFF AND TRADE AGREEMENT TERMS

The *Harmonized Tariff Schedule of the United States* (HTS) replaced the *Tariff Schedules of the United States* (TSUS) effective January 1, 1989. Chapters 1 through 97 are based on the internationally adopted Harmonized Commodity Description and Coding System through the 6-digit level of product description, with additional U.S. product subdivisions at the 8-digit level. Chapters 98 and 99 contain special U.S. classification provisions and temporary rate provisions, respectively.

Rates of duty in the *general* subcolumn of HTS column 1 are most-favored-nation (MFN) rates; for the most part, they represent the final concession rate from the Tokyo Round of Multilateral Trade Negotiations. Column 1-general duty rates are applicable to imported goods from all countries except to those enumerated in general note 3(b) to the HTS, whose products are dutied at the rates set forth in *column 2*. Goods from the People's Republic of China, Czechoslovakia, Hungary, Poland, and Yugoslavia are among those eligible for MFN treatment. Among articles dutiable at column 1-general rates, particular products of enumerated countries may be eligible for reduced rates of duty or for duty-free entry under one or more preferential tariff programs. Such tariff treatment is set forth in the *special* subcolumn of HTS column 1.

The Generalized System of Preferences (GSP) affords nonreciprocal tariff preferences to developing countries to aid their economic development and to diversify and expand their production and exports. The U.S. GSP, enacted in title V of the Trade Act of 1974 and renewed in the Trade and Tariff Act of 1984, applies to merchandise imported on or after January 1, 1976, and before July 4, 1993. Indicated by the symbol "A" or "A*" in the special subcolumn of column 1, the GSP provides duty-free entry to eligible articles that are the product of, and are imported directly from, designated beneficiary developing countries, as set forth in general note 3(c)(ii) to the HTS.

The *Caribbean Basin Economic Recovery Act* (CBERA) affords nonreciprocal tariff preferences to developing countries in the Caribbean Basin area to aid their economic development and to diversify and expand their production and exports. The CBERA, enacted in title II of Public Law 98-67, implemented by Presidential Proclamation

5133 of November 30, 1983, and amended by the Customs and Trade Act of 1990, applies to merchandise entered, or withdrawn from warehouse for consumption, on or after January 1, 1984; this tariff preference program has no expiration date. Indicated by the symbol "E" or "E*" in the special subcolumn of column 1, the CBERA provides duty-free entry to eligible articles that are the product of, and are imported directly from, designated countries, as set forth in general note 3(c)(v) to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "IL" are applicable to products of Israel under the *United States-Israel Free-Trade Area Implementation Act* of 1985, as provided in general note 3(c)(vi) of the HTS. When no rate of duty is provided for products of Israel in the special subcolumn for a particular provision, the rate of duty in the general subcolumn of column 1 applies.

Preferential rates of duty in the special duty rates subcolumn of column 1 followed by the symbol "CA" are applicable to eligible goods originating in the territory of Canada under the *United States-Canada Free-Trade Agreement*, as provided in general note 3(c)(vii) to the HTS.

Other special tariff treatment applies to particular *products of insular possessions* (general note 3(a)(iv)), goods covered by the *Automotive Products Trade Act* (general note 3(c)(iii)) and the *Agreement on Trade in Civil Aircraft* (general note 3(c)(iv)), and *articles imported from freely associated states* (general note 3(c)(viii)).

The *General Agreement on Tariffs and Trade* (GATT) (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) is the multilateral agreement setting forth basic principles governing international trade among its more than 90 signatories. The GATT's main obligations relate to most-favored-nation treatment, the maintenance of scheduled concession rates of duty, and national (nondiscriminatory) treatment for imported products. The GATT also provides the legal framework for customs valuation standards, "escape clause" (emergency) actions, anti-dumping and countervailing duties, and other measures. Results of GATT-sponsored multilateral tariff negotiations are set forth by way of separate schedules of concessions for each participating contracting party, with the U.S. schedule designated as schedule XX.

Officially known as "The Arrangement Regarding International Trade in Textiles," the *Multifiber Arrangement* (MFA) provides a framework for the negotiation of bilateral agreements between importing and producing countries, or for unilateral action by importing countries in the absence of an agreement. These bilateral agreements establish quantitative limits on imports of textiles and apparel, of cotton, wool, silk blends, and oth-

er vegetable and manmade fibers in order to prevent market disruption in the importing countries—restrictions that would otherwise be a departure from GATT provisions. The United States has bilateral agreements with more than 30 supplying countries, including the four largest suppliers: China, Hong Kong, the Republic of Korea, and Taiwan.

