Industry & Trade Summary

Audio and Video Recording and Reproducing Equipment

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PREFACE

In 1991 the United States 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 audio and video recording and reproducing equipment covers the period 1989 through 1993 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 electronic technology and equipment sector.

USITC publication number	*Publication date*	*Title*
2445	January 1992	Television receivers and video monitors
2648	July 1993	Measuring, testing, controlling, and analyzing instruments
2674	September 1993	Medical goods
2708	December 1993	Semiconductors
2728	February 1994	Capacitors
2730	February 1994	Navigational and surveying instruments
2820	October 1994	Telecommunications equipment
2821	October 1994	Computers, peripherals, and computer components
2822	October 1994	Audio and video recording and reproducing equipment

[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.

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INTRODUCTION

This report discusses industry, market, and trade information for the global audio and video recording and reproducing equipment (hereafter, audio and video equipment) industry during the period 1989-93. Following the introduction, this report presents profiles of the U.S. and foreign industries, a description of tariff and nontariff measures that may affect trade, and a discussion of U.S. industry performance in domestic and foreign markets.

For the purposes of this report, audio and video equipment is divided into two categories: first, recording and reproducing systems such as audio and video tape players and recorders, phonographs, and audio compact disc (CD) players and, second, audio components such as loudspeakers, amplifiers, microphones, and headphones (figure 1).[1] Turntables and other parts are included with recording and reproducing systems if they are used only as parts of such systems.

Audio and video equipment includes primarily consumer electronics products used for leisure activities in homes and automobiles (figure 1). However, it also includes studio production equipment, coin-operated audio systems, public address systems, and other products for the commercial market.

The mix of products included in audio and video equipment has changed repeatedly with changes in technology. The late 1940s and 1950s saw the emergence of long-play phonograph records, high-fidelity amplifiers and loudspeakers, and stereo records. The commercialization of magnetic tape recording in the late 1940s made audio recording possible outside the studio, and the introduction of tape cassettes in 1962 led to a large consumer market for tape recorders. Semiconductor technology, introduced during the 1960s and early 1970s, gave rise to more reliable, compact, and portable systems. Video recording equipment entered studio use in 1956, and a commercially successful consumer videocassette recorder (VCR) emerged in 1975. Video laserdisc systems, introduced several years later, found little market success initially,[2] but the incorporation of digital sound in the mid-1980s has made laserdisc systems popular among high-end consumers.[3]

The most significant recent development in the industry has been the introduction of digital technology for both tape and optical disc systems. Audio CD systems, introduced in 1983, have found strong success in the consumer market, largely replacing sales of phonograph systems. A recordable format, digital audio tape (DAT), has been adopted primarily for professional applications.[4] Digital compact cassette (DCC) and MiniDisc (MD) systems, introduced in 1992 and 1993, respectively, improve on CD and DAT systems by combining recordability with compact tape and disc formats based on advanced data compression techniques. Some observers expect these systems to displace sales of audio tape recorders. The first recordable CD (CD-R) system intended for the consumer audio market became available in 1994.[5]

In digital video products, 1993 saw the introduction of video CD (CD-V), which uses data compression to fit up to 74 minutes of full-motion video programming on a standard CD. A more advanced technology, digital video disc (DVD), is expected to come to market in early 1996. DVD will fit 135-minute feature films onto discs the same size as current CDs, although with a different format. DVD is expected to offer better picture quality than current recording formats, audio tracks for multi-speaker home theater systems, and voice tracks in as many as five languages. Digital tape VCRs are expected to come to market in 1995.

Two other optical disc-based systems, compact disc-interactive (CD-I) and 3DO, introduced in 1991 and 1993, respectively, are "multimedia" products that combine audio, video, graphic, text, and numeric data for games, education, and other applications. Other multimedia systems[6] are expected to reach the market in 1995.[7]

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[1] This report covers audio and video recording and reproducing equipment but not video cameras, television receivers, radios, and radio-recorder or radio-player combinations. However, television receivers combined with videotape recorders are included. Television receivers are discussed in a previous report; see U.S. International Trade Commission (USITC), *Industry and Trade Summary: Television Receivers and Video Monitors*, USITC publication 2445, Jan. 1992.

[2] Other products that enjoyed a relatively brief success during the 1970s include the eight-track audio tape system and the quadraphonic stereo phonograph.

[3] Laserdisc systems are most commonly sold as "combi-players," able to play audio and video CDs as well as laserdiscs.

[4] Introduction of DAT systems was delayed for several years due to concern that the diffusion of a recordable digital system could lead to extensive violations of copyright on audio recordings.

[5] CD-R differs from MD in using discs playable in standard CD systems and in not using data compression.

[6] Multimedia systems represent a convergence of the technologies for video recording and reproducing systems, computers, and video game systems. This report considers only those multimedia systems that are capable of full-motion video, use magnetic or optical (disc) media, and are dedicated systems rather than computers used for other purposes as well.

[7] Other new products introduce minor variations to the product types discussed here. For example, CD-graphic (CD-G) and Karaoke CD systems add visual graphics and text to audio CD systems, using a television screen or video monitor.

Figure 1
Audio and video equipment: Principal products, markets, and uses

Products	Markets and uses
Recording and reproducing systems • Phonographs and turntables • Audio tape recorders and players Reel-to-reel Analog cassette Digital audio tape (DAT) Digital compact cassette (DCC)* • Audio optical disc systems Compact disc (CD) MiniDisc (MD)* • Videotape recorders and players Videocassette (VHS, Beta, 8 mm.) U-matic and professional formats • Video optical disc systems Analog laserdisc Video CD* Multimedia* (3DO, CD-I, etc.) • Parts and accessories	**Consumer market** • Leisure activities Home Automobile Portable **Commercial market** • Studio production and broadcasting • Coin-operated music reproduction • Office dictation * Emerging digital systems
Audio components • Loudspeakers • Amplifiers and preamplifiers • Microphones • Headphones and earphones	**Consumer market** • Used with recording and reproducing systems, radios, and musical instruments **Commercial market** • Studio production and broadcasting • Public address and concert sound

Source: Compiled by the staff of the U.S. International Trade Commission.

U.S. domestic production of audio and video equipment is heavily concentrated in audio components. Loudspeakers alone accounted for 57 percent of the value of U.S. production in the industry during 1993, other audio components about 30 percent, and recording and reproducing systems 13 percent. Import concentrations are reversed: recording and reproducing systems represented 79 percent of the value of U.S. imports in 1993, and audio components 21 percent.

U.S. domestic production of recording and reproducing systems accounted for 6 percent of U.S. consumption of systems during 1993, and U.S. production of audio components accounted for about 78 percent of U.S. consumption of components. Net imports accounted for the remaining consumption in each category.

The U.S. audio and video equipment industry's relatively low market share in its home market is partly the result of relatively high U.S. wages and other production costs. These costs give the U.S. a competitive disadvantage, relative to low-wage Asian countries, in the production of "commodity" products, such as consumer recording and reproducing systems and low-end audio components. The U.S. industry has the highest share of domestic and foreign markets in studio recording systems and high-end audio components, for which customers are willing to pay a price premium for superior product performance.

Nevertheless, labor costs alone do not account for the competitive performance of the U.S. audio and video equipment industry. Western Europe produces a much larger volume in system products, particularly VCRs, despite its comparably high (or higher) labor costs. Japan produces nearly half the world's supply of audio and video equipment despite having wages much higher than those in neighboring Asian countries.[8] This is possible because automated manufacturing processes have substantially reduced the amount of labor used in production.

Another part of the reason for the decline in performance of the U.S. industry appears to be that U.S. firms failed to respond aggressively to low-priced, high-quality Japanese imports in the 1960s and 1970s.[9]

[8] However, Japanese companies have increasingly shifted production to Southeast Asian countries in recent years in response to high domestic labor costs and the increasing value of the yen.

[9] Michael L. Dertouzos, Richard K. Lester, Robert M. Solow, and the MIT Commission on Industrial Productivity, *Made in America: Regaining the Productive Edge* (New York: Harper Collins, 1989), Appendix D, "The Consumer Electronics Industry," pp. 217-231. See also the section, "Changes in U.S. Industry Performance," below in this report.

U.S. manufacturers were slow to improve either design quality, for example by incorporating semiconductor components, or manufacturing techniques. Instead, they responded to imports largely by cost-cutting moves, such as moving component production and system assembly to low-wage countries in Asia. Now, having exited the industry, U.S. firms may lack the design and manufacturing skills to enter again.

Most of the basic components of audio and video equipment are electronic, including both specialized and commodity integrated circuits, as well as discrete semiconductor devices. Other significant components include such diverse items as magnetic recording or pickup heads for audio and video tape equipment, laser devices for CDs, phonograph pickups and styli (needles), diaphragms for microphones and loudspeakers, and motors for the moving parts of all audio and video systems. These components may be produced by the equipment assembler, or they may be purchased from outside suppliers. There is a substantial market, for example, for electronic subassemblies of CD players.

Commodity audio and video products are manufactured on highly automated assembly lines in which electronic subassemblies and other components are assembled within metal, plastic, or wood housings or cabinets. Production of electronic subassemblies usually involves the insertion of integrated circuits and discrete components into printed circuit boards. Much of this work, too, is automated. Specialty products, such as studio recording equipment and high-performance loudspeakers and amplifiers, are assembled using smaller-scale, more labor-intensive methods.

U.S. INDUSTRY PROFILE

Industry Structure

The U.S. audio and video equipment industry includes approximately 120 to 140 U.S.-owned and several foreign-owned firms that manufacture in the United States (table 1).[10] A substantial majority of the U.S.-owned firms are privately held and small, with fewer than 20 employees.[11] Approximately 110 to 120 firms produce specialty audio components for both the consumer and commercial markets. Of these firms, approximately 60 produced loudspeakers, 40 supplied amplifiers, and 14 produced microphones during 1992.

By contrast, relatively few firms produce recording or reproducing systems in the United States. In 1992, approximately 5 firms produced consumer phonographs and turntables, 4 firms produced audio tape recorders, and 7 firms made CD players (table 1). Production of tape recorders and CD players appears to have consisted primarily in the packaging of foreign components for particular branded audio component systems.

In addition, 3 firms produced videotape recorders or televisions combined with video recorders during 1992. There was no reported U.S. production of videodisc systems.

Principal firms

The three largest U.S. suppliers of audio and video equipment, Bose, Harman International, and International Jensen, produce loudspeakers and other audio components for both the U.S. and foreign markets. Like other U.S. suppliers of these products, they produce primarily for the high end of the market, which is less price sensitive.

Bose, a privately held company, is reportedly the largest U.S. manufacturer of loudspeakers; Harman is the largest producer of audio components of all kinds. Harman and Jensen, both holding companies, have brought about a certain amount of industry consolidation over the past two decades by buying small companies, often technologically strong but managerially and financially weak, and combining their financial, research, and manufacturing resources. Harman's U.S. holdings include Infinity, JBL, Pyle, Fosgate, Harman Kardon, and other brands, while Jensen's include Acoustic Research, Advent, and the Jensen brand.

Harman's holdings also include several European producers of loudspeakers, amplifiers, and microphones. Jensen has also made some European acquisitions in the past three years. Bose has reportedly

[10] The products discussed in this summary are covered for statistical reporting purposes by the following Standard Industrial Classification (SIC) product codes: SIC 36514, Recorders, phonographs, high-fidelity components, and radio and television chassis; SIC 36515, Speaker systems, microphones, home-type electronic kits, and commercial sound systems, including public address systems; SIC 3579, Dictating machines; SIC 36512 21, Color television receivers with video tape recorders; SIC 36632 12 (Studio audio) amplifiers and preamplifiers; part of SIC 36632 17, Other (studio) audio equipment; part of SIC 36632 29, Other (studio) video equipment; SIC 36799 01, Earphones and headsets, except telephone; SIC 36799 03, Phonograph cartridges and pickups; SIC 36799 05, Phonograph needles and styli; and portions of other product codes within SIC 367, Electronic components and accessories.

[11] As of 1987, 119 out of 378 establishments (plants) in SIC industry 3651, Household audio and video equipment, had 1 to 4 employees, and 109 more had 5 to 19 employees (U.S. Department of Commerce, *1987 Census of Manufactures: Industry Series (MC87-I-36D)* (Washington: U.S. Government Printing Office (GPO), June 1990)). Most of these smaller plants are the only plants of their firms. Larger plants are more likely to belong to multi-plant firms, and many of the larger plants included in SIC industry 3651 produce radio and television receivers and other products that are not covered by this report.

Table 1
Audio and video equipment: Structure of U.S. industry, 1992

Industry segment	Number of firms[1]	Major firms, brands, and production locations
Recording and reproducing systems:		
Phonographs and turntables:		
Coin-operated	4	(2)
Consumer	35	(2)
Parts	310	(2)
Audio tape recorders and players	4	(4)
CD players	7	(4)
Videotape recorders:		
Studio	1	Ampex—CA
Consumer	2	American Kotobuki—OR[5], Hitachi—CA[6]
Video laserdisc players	0	NA
Audio components:		
Loudspeakers	760	Bose—MA; Harman International (Infinity, JBL, and others)—CA; International Jensen (Jensen, Advent, Acoustic Research)—IL, MA; Onkyo—IN; Polk—MD; Sony—PA
Amplifiers:		
Consumer	723	Harman International (Fosgate and others)—CA, UT
Studio	826	Harman International (various brands)—CA
Public address[9]	21	(2)
Microphones	14	Shure—IL
Headphones	39	(2)

[1] The exact total number of firms in the U.S. audio and video equipment industry cannot be derived from these figures, because an uncertain number of firms produce more than one type of product.
[2] Industry segment dominated by small, specialty producers
[3] Based on 1991 data; estimated from figures for multiple subcategories, where the number of firms participating in more than one subcategory is uncertain.
[4] Industry segment consists primarily of firms that package imported sub-assemblies for branded component audio systems.
[5] Firm assembles television receivers combined with VCRs.
[6] Firm ceased U.S. production during 1992.
[7] Estimated from figures for multiple subcategories, where the number of firms participating in more than one subcategory is uncertain.
[8] Based on 1991 data.
[9] Includes musical instrument amplifiers and loudspeaker-amplifier combinations.

Source: Compiled by the staff of the U.S. International Trade Commission from official statistics of the U.S. Department of Commerce and other sources.

manufactured in Japan for at least several years. Bose, Harman, and Jensen appear to be the only U.S.-owned firms in the industry with substantial foreign production facilities. Nearly all their foreign production is consumed in foreign markets.

While Harman and, to a lesser extent, Jensen have broad product lines in audio components, other U.S. manufacturers are more specialized. Significant producers of loudspeakers include Polk and Boston Acoustics. Shure is a leading manufacturer of microphones. Some foreign-based suppliers, notably Sony (Japan) and Pioneer (Japan), assemble loudspeakers in the United States using imported parts. Onkyo (Japan) produces loudspeaker parts in this country both for its own use and for sale to U.S.-based manufacturers.

The largest U.S. producers of recording and reproducing systems in recent years have been Japanese-owned plants that assemble VCRs, or television receivers combined with VCRs, using foreign components. The only major U.S.-owned supplier of systems has been Ampex Corp., a world leader in video recording equipment for the studio and broadcast market.

Changes in U.S. Industry Performance

U.S. firms controlled over 90 percent of the domestic market for audio and video equipment until the mid-1960s. The U.S. industry's decline in market share, particularly in recording and reproducing systems, began with Japan's entry into the U.S. market with "solid-state," or semiconductor-based, phonograph and audio tape recording systems. These systems

were lower in price, more compact, and often more reliable than U.S. products.[12]

The initial response of U.S. manufacturers to Japanese competition was largely to outsource some of their own component production and system assembly to Japan and other low-wage Asian countries. This had the effect of further transferring technical and manufacturing skills to other countries, leading to the emergence of yet more foreign competition.

U.S. firms were relatively slow, however, to make major changes in product design and manufacturing processes in order to match the features and quality of imported products. They remained several years behind Japanese firms in adopting semiconductor technology. The major reason for this, it appears, was that low-priced imports made recording and reproducing systems, like other consumer electronics products, a relatively unattractive line of business for U.S. corporations.[13] Prospective rates of return on new investment declined below the "hurdle rates" used in decision making, and so U.S. firms did not undertake the substantial investments that would have been necessary to remain competitive. Japanese competitors, by contrast, were content with lower rates of return on investment. Moreover, they had become much more skilled than U.S. firms at reducing costs through improvements in production processes.[14]

As a result, the leading U.S. recording and reproducing system suppliers ceased U.S. production during the 1970s and eventually also ceased foreign production, selling their product lines to foreign firms. Such major U.S. trade names as RCA and GE are now owned by Thomson-CSF (France), while Magnavox is owned by Philips Electronics N.V. (Netherlands). These firms do not manufacture recording and reproducing systems in the United States.[15]

At the present time, no U.S. firms have the design and manufacturing skills to produce consumer recording and reproducing systems, except phonographs. However, a recently founded company, 3DO Corp. of Redwood City, CA, has applied U.S. computer technology to design hardware and software for a new multimedia system, combining audio, video, graphic, text, and numeric information for new types of games and other interactive applications. 3DO systems are being manufactured exclusively by foreign licensees, primarily in Japan.[16] 3DO systems entered the U.S. market in 1993 and the Japanese market in 1994.

Another U.S. firm, Dolby Laboratories, designs and licenses signal processing circuitry for audio recording and reproducing systems. Dolby noise reduction systems are commonly employed in tape recorders and players. The company is promoting its six-channel "Dolby Surround Digital" (DSD) coding system for future use in home theater laserdiscs.[17]

The VCR: A Case Study

The development of the VCR offers an instructive case study in how foreign firms took the lead in a promising technology originally developed in the United States.[18] Ampex developed the first commercially successful video recorder in 1956, and it long held the lead in the studio market. When Ampex attempted to enter the broader educational and consumer markets, however, it failed. Ampex apparently lacked the design and manufacturing skills to produce machines that were simple to use and could operate reliably without frequent attention from technicians. More than a dozen U.S. companies, including CBS, RCA, and a start-up firm called Cartridge Television, Inc., worked on schemes to develop a consumer system during the late 1960s and early 1970s, but they all proved too complex or cumbersome to be cost-effective.

The first practical system intended for the consumer market was the U-Matic, a cartridge tape system developed in 1970 by Sony with assistance from Matsushita Electric Industrial Co. (Japan) and Victor Company of Japan (JVC). Sony had obtained rights to Ampex' technology in 1960 in exchange for developing transistorized circuits for use by Ampex.[19] Sony's subsequent efforts to refine and improve the technology enabled it to make the U-Matic a relatively compact, reliable system. Nevertheless, the U-Matic proved too large and expensive for extensive adoption

[12] U.S. Congress, Office of Technology Assessment, *International Competitiveness in Electronics* (Washington: U.S. GPO, 1983); U.S. Department of Commerce, *The U.S. Consumer Electronics Industry* (Washington: U.S. GPO, 1975).

[13] Dertouzos et al., *Made in America.*

[14] OTA, *International Competitiveness in Electronics*; Dertouzos et al., *Made in America.*

[15] However, both Thomson and Philips manufacture other products, including television receivers, in the United States.

[16] However, AT&T Corp. has licensed 3DO system technology in order to develop applications for use in connection with telecommunication networks.

[17] DSD was selected in 1993 as the audio technical standard for U.S. high-definition television.

[18] For further discussion of these events see James Lardner, *Fast Forward: Hollywood, the Japanese, and the Onslaught of the VCR* (New York: Norton, 1987); MIT Commission on Industrial Productivity, "The Decline of U.S. Consumer Electronics Manufacturing: History, Hypotheses, and Remedies," in *The Working Papers of the MIT Commission on Industrial Productivity* (Cambridge, MA: MIT Press, 1988); and R.S. Rosenbloom and M.A. Cusumano, "Technological Pioneering and Competitive Advantage: The Birth of the VCR Industry," *California Management Review*, vol. 29, pp. 51-76, 1987.

[19] Ampex failed to use Sony's devices because its engineers were unfamiliar with semiconductor technology.

by consumers, although it was, unexpectedly, widely used in the educational and studio markets, and it helped to launch a new market for portable video camera systems. Philips introduced a consumer system in 1972 that found limited success in the European market, but the consumer market developed substantially only after the introduction of two less expensive and more compact systems, Sony's Betamax in 1975 and JVC and Matsushita's Video Home System (VHS) in 1976.

No U.S. firms entered the VCR market, both because U.S. firms lacked the design and manufacturing technology to compete effectively and because rates of return would have been low in a product market with a large number of competitors. According to industry observers, Ampex now shares its technological and market lead in studio video recording systems with Sony, Matsushita, and Hitachi (Japan), which have transferred their technology and experience from consumer systems to this more specialized, high-performance market. Between 1984 and 1992, Matsushita and Hitachi assembled some VCRs in the United States. They do so no longer, although American Kotobuki, a subsidiary of Matsushita, continues to assemble television receivers combined with VCRs at a U.S. facility. The VCR units that go into these products are reportedly imported as fully assembled units.

Employment, Research, and Distribution

The U.S. audio and video equipment industry as a whole employed approximately 13,000 persons in 1993, about 10,000 of whom were manufacturing workers.[20] These levels appear to have declined slightly since 1989. The industry is concentrated in the Mid-Atlantic, Northeast, North Central, and West Coast regions.

Levels of automation in the U.S. audio and video equipment industry vary with the scale of production and size of the firm. For example, production of TV-VCR combinations is highly automated, whereas small suppliers of specialty loudspeakers and other audio components use relatively labor-intensive methods. The skill levels required of production workers range from relatively low for many automated processes to relatively high for critical subsystems of studio video recorders and other high-performance equipment.

Research and development (R&D) activities in the industry have focused on modifying loudspeakers and amplifiers to achieve specific subjective sound qualities that industry participants and audiophiles describe as "brightness," "fullness," and "depth" of sound.[21] The larger loudspeaker manufacturers have their own laboratories for this purpose, while smaller suppliers sometimes have consultative relationships with university laboratories. Foreign-owned manufacturers undertake little R&D in the United States, as they generally develop products in the countries where the firms' headquarters are located.

As with other consumer electronics products, commodity recording and reproducing systems are distributed through a wide variety of outlets, including electronics superstores such as Circuit City, electronics specialty stores and appliance stores, mass merchandisers, and department stores. Specialty audio components are sold primarily through electronics specialty stores, magazines, and catalogs.

Consumer Characteristics and Factors Affecting Demand

The potential U.S. market for audio and video equipment includes virtually all households. It also includes a relatively small number of such commercial establishments as radio and television studios and public meeting places that use public address or other audio or video systems.

The rate of household penetration for even the newer audio and video products is relatively high. VCRs are owned by an estimated 77 percent of households,[22] and most sales in this segment now take the form of replacements, additions of second and third systems (often in the form of TV-VCR combinations), and upgrades to equipment incorporating such enhancements as stereo sound. Within 10 years of the introduction of audio CD systems in 1983, cumulative U.S. sales reached over 50 million units, but the potential for first-system sales is still substantial. Furthermore, many owners of home CD systems are buying automobile and portable systems as well.

The factors that affect demand in this industry differ by product segment. Nearly all recording and reproducing systems, as well as lower-end audio components, are commodity products with little difference among manufacturers in product technology, features, or performance. As a result, consumers choose among suppliers primarily on the basis of price, and suppliers must closely match each others' prices in order to make sales.

[20] USITC staff estimates based on U.S. Department of Commerce, Bureau of the Census, *Annual Survey of Manufactures*, 1989, 1990, and 1991 editions (Washington: U.S. GPO, June 1991, Mar. 1992, Dec. 1992), and *1987 Census of Manufactures*.

[21] USITC staff telephone interviews with U.S. and Japanese industry representatives, Sept. 27, 1993.

[22] Electronic Industries Association (EIA), *The U.S. Consumer Electronics Industry in Review*, 1992 edition (Washington, D.C.), p. 76.

Differences in the quality of audio signal reproduction are a more important factor in markets for specialty audio components such as loudspeakers and amplifiers. In these markets, consumers choose among suppliers on the basis of product performance as well as price. Consumers have widely varying tastes in the subjective elements of sound quality, and many consumers have strong loyalties toward specific product brands. As a result, suppliers have some freedom to set prices above or below the level set by the competition, trading off profit per unit against market share.

The demand for audio and video equipment in general, as opposed to the demand for the products of one manufacturer rather than another, has also been affected by long-term developments in product quality and price. Prices of both VCRs and audio CD players have declined substantially since their introduction, in nominal (current-dollar) as well as real (inflation-adjusted) terms. The real price of audio products as a whole in 1991 was less than half the level in 1977.[23] These price declines have led to increased unit sales, although sales in dollar terms have fluctuated both up and down in recent years. Periodic product improvements, such as "oversampling" digital filters[24] and disc changers in CD players and multiple recording/playback heads and stereo sound in VCRs, have also spurred consumer demand for whole categories of products, leading to new sales to households that already owned the product type.

Competition between new and old technologies has also been a major factor affecting demand. Most notably, the improvement that digital audio products offer in the quality of sound reproduction has led to the nearly complete displacement of phonographs by CD players in the market for new non-recordable systems.[25] The new digital systems, MD and DCC, are expected to make inroads into the market for portable, recordable systems previously served by analog cassette tape recorders.

Another factor that affects demand for some system products is the emergence of de facto technical standards. For example, during the 1980s, market dynamics led to the increasing dominance of the VHS system for VCRs over the rival Betamax system, so that today almost no Betamax systems are produced. Both systems enjoyed substantial sales in the late 1970s and early 1980s. However, when the rental market for prerecorded videocassette tapes developed in the mid-1980s, rental shop owners gave greater prominence to VHS tapes as a result of that system's lead in market share. After that point, sales of Betamax systems declined as new customers preferred the system that they could use to play the greatest number of tapes.[26]

In order to prevent a similar system rivalry in the market for CD players, a common format was agreed on by manufacturers before the product came to market. However, DCC and MD are competing systems in the emerging market for recordable digital audio systems, and many industry observers expect that one of these systems, probably MD, will emerge as the de facto standard, while the other will enjoy only limited sales.[27] MD's advantages over DCC include a fast search capability, easy editing, and a nearly indestructible storage medium. DCC's advantages include the relative familiarity of cassette tape as a medium, the ability of DCC players to play conventional analog tape cassettes, and a sound quality judged slightly better than that of MD.

A similar competition among 3DO, CD-I, and other multimedia systems may also lead to a de facto standard. Leading industry participants have agreed upon a common format for first-generation video CDs, which can be played by current audio CD and multimedia players equipped with adapters. However, the two teams of Sony with Philips and Toshiba (Japan) with Time Warner (United States) have proposed competing systems for advanced digital video disc players. As other industry participants consider which of the systems to produce, they reportedly hope that one will emerge as the de facto standard before manufacturing begins, thus avoiding a costly standards battle.[28]

FOREIGN INDUSTRY PROFILE

The foreign audio and video equipment industry is heavily concentrated in Japan, which by itself accounts for nearly half of world production (table 2). Furthermore, Japanese companies own or control a substantial portion of the production facilities located in Southeast Asia, Europe, and North America. Korea is the second largest producer of audio and video equipment, and Germany is fourth largest, having been replaced as third largest by the United States in 1993.

[23] The consumer price index for audio products in 1991 was at approximately the same level as in 1977, while the consumer price index for all goods and services more than doubled. EIA, *The U.S. Consumer Electronics Industry in Review*, p. 12.

[24] These filters reduce some of the "noise" that digitization introduces to sound waves.

[25] Much of the current demand for phonograph turntables is for replacement parts for systems owned by consumers with large collections of phonograph records.

[26] Rosenbloom and Cusumano, "Technological Pioneering and Competitive Advantage."

[27] Joseph Palenchar, "Sony takes the lead in digital-audio format battle," *Electronic Business Buyer*, Nov. 1993, pp. 79-81.

[28] Audio Week, Oct. 3, 1994, p. 6; Oct. 10, 1994, p. 2.

Table 2
Consumer audio and video equipment: World[1] production, by selected countries and regions, 1992

Country	VCRs	Audio systems: CD players	Audio systems: Tape & other	Audio components[2]	Total	Share of world	Change from 1991[3]
	Millions of dollars					*Percent*	
North America:							
Canada	25	[4] -	-	21	46	0.2	-23.3
Mexico[5]	-	55	95	99	249	0.9	5.5
United States[6]	50	1	85	1,505	1,641	6.2	9.9
Total	75	56	180	1,625	1,936	7.3	8.2
Europe:							
Austria	397	46	73	35	551	2.1	-18.6
Belgium	[7]106	33	15	55	209	0.8	10.0
France	284	61	5	40	390	1.5	-14.8
Germany	772	147	36	367	1,322	5.0	-17.6
United Kingdom	442	33	11	172	658	2.5	-20.0
All other[5]	237	87	68	348	740	2.8	3.6
Total	2,238	407	208	1,017	3,870	14.7	-13.3
Asia:							
China[5]	270	45	345	470	1,130	4.3	20.3
Indonesia	100	-	34	65	199	0.8	89.5
Japan	[8]7,166	1,654	1,685	2,362	12,867	48.8	-14.3
Korea	1,691	[9]434	([9])	501	2,626	9.9	-1.6
Malaysia	488	-	320	148	956	3.6	33.7
Singapore	399	-	543	64	1,006	3.8	34.9
Taiwan	253	-	242	400	895	3.4	0.6
Thailand	331	[9]45	([9])	69	445	1.7	15.6
All other	51	22	106	69	248	0.9	-38.0
Total	10,749	2,200	3,275	4,148	20,372	77.2	-6.8
Other:							
Brazil	180	38	45	123	386	1.5	3.5
All other[5]	52	-	38	34	124	0.5	0.0
Total	232	38	83	157	510	1.9	2.6
Grand total	13,269	2,167	4,130	6,827	26,393	100.0	-6.8

[1] Includes 30 major and 10 emerging economies, and excludes Central and Eastern Europe and other former non-market, non-exporting economies.
[2] Loudspeakers, amplifiers, microphones, and headphones.
[3] Measured in U.S. dollars at each year's current exchange rate.
[4] "-" indicates no reported production.
[5] Figures are, or include, preliminary estimates made during 1992.
[6] Figures appear to omit studio amplifiers, most parts, and other equipment included in U.S. industry statistics presented elsewhere in this report.
[7] Includes laserdisc players.
[8] Includes laserdisc players and kits for VCRs assembled in other countries.
[9] Total for all audio systems listed under CD players.

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

Source: Elsevier Advanced Technology, *Yearbook of World Electronics Data*, vol. 1: West Europe (Oxford, 1993); vol. 2: America, Japan, & Asia Pacific (Oxford, 1994); vol. 3: Emerging Countries & World Summary (Oxford, 1992).

The remainder of non-U.S. production is concentrated in several Western European and Southeast Asian countries, but none of these accounts for more than about 4 percent of world production.

The largest single producer of audio and video equipment is Sony. Other key manufacturers are Matsushita, JVC, Philips, Thomson-CSF, Goldstar (Korea), and Samsung (Korea).

Sony and Philips have been the leading developers of audio and video technology and market applications over the past several decades. Philips, for example, introduced the cassette format for audio tape recorders, while Sony was a pioneer in applying semiconductor technology to audio and video products. Philips introduced a consumer VCR in 1972 that enjoyed limited commercial success in Europe, but Sony

introduced the first widely successful VCR in 1975. The two companies jointly developed digital audio technology leading to both companies' introduction of the CD player in the early 1980s and, more recently, to Sony's DAT and MD recorders and Philips' DCC recorder. The two companies plus Matsushita and JVC defined an industry standard for video CD in 1993. Philips is also a pioneer in multimedia technology with its CD-I system.

Japan

The Japanese audio and video equipment industry gained its world leading position during the 1960s and 1970s as a result of superior design and manufacturing skills, relatively low wages, and the use of semiconductor technology to enhance product quality and reduce production costs. As Japanese wages and the yen have risen in value, the competitiveness of the Japanese industry has declined somewhat, with the country's world market share declining steadily since 1984. The share of Japanese production going to export markets declined from approximately 80 percent in 1985 to approximately 60 to 65 percent during 1988-91.[29] This happened as a result of the transfer of Japanese companies' production to other Asian countries, economic recession in major foreign markets, and the growth of Japan's domestic consumer market. More recently, as a result of recession in the domestic market, Japanese production of audio and video equipment fell by 19 percent in 1992[30] and another 15 percent in 1993,[31] as measured in yen. Japanese exports of these products declined by 20 percent or more in both 1992 and 1993.

Sony, Matsushita, JVC, Aiwa Co., and Akai Electric Co. supply a broad range of both audio and video equipment. Alps Electric Co. (Alpine brand), Kenwood Corp., Onkyo Corp., and Pioneer Electronic Corp. are major suppliers of audio systems and components. By contrast, Sharp Corp., Mitsubishi Electric, and Hitachi primarily supply consumer video recording systems, while a Hitachi subsidiary, Hitachi Denshi, produces studio video recording systems. Several Japanese companies are original equipment manufacturers (OEMs) of systems and components for brands of companies based in Europe and North America.

Japanese companies have also contributed to the globalization of the industry by building a substantial number of manufacturing plants in other Asian countries, Europe, and North America.[32] In Europe and North America they did so partly in response to popular concerns about the decline of those regions' domestic consumer electronics industries. Japanese companies have manufactured in other Asian markets in order to take advantage of low wages. The products manufactured in these regions are primarily more mature ones, such as VCRs. New types of products, which involve more frequent changes in product design and manufacturing process, are produced almost exclusively in Japan.

Approximately one third of Japan's exports of audio and video equipment in recent years has gone to the U.S. market. Another third has been shipped to Europe, and the remainder to other countries.

Europe

European audio and video equipment firms responded to emerging Japanese competition in the 1960s and 1970s more aggressively than the U.S. industry. With some protection from tariff and nontariff trade barriers, they adopted new product and manufacturing technologies, so that currently there is European production in a broad range of audio and video equipment.

The European audio and video equipment industry is dominated by two European firms, Philips and Thomson-CSF, and by Japanese firms with European manufacturing facilities. Philips and Thomson both produce a wide range of audio and video equipment and have facilities in several European countries. As a result primarily of high European wage costs, including payroll taxes, these firms also have plants in Southeast Asia, and Thomson sources some audio systems from Matsushita. In 1992 Thomson closed a VCR plant in Berlin, shifting production to Singapore. That same year, Philips began shifting some production from Western Europe to lower-wage countries in Eastern Europe. Production of audio and video equipment in Europe as a whole declined by 13 percent in 1992, and in the four largest supplying countries it declined by 15 to 20 percent (table 2).

Japanese suppliers established European manufacturing plants primarily to circumvent existing and potential tariff and nontariff barriers to imports from Japan.[33] As of June 1991, Japanese firms produced VCRs at 19 facilities in Europe, primarily in the United Kingdom, Germany, and France. They also produced CD players at 9 facilities and component-based audio systems at 10 facilities.

Like the United States, Europe also has many smaller producers of such specialty audio components

[29] Dempa Publications, Inc., *Japan Electronics Almanac 1992* (Tokyo, 1992).

[30] Production declined by 14 percent as measured in U.S. dollars (table 2).

[31] USITC staff estimate based on *Journal of the Electronics Industry*, May 1994, p. 50.

[32] Dempa, *Japan Electronics Almanac 1992*.

[33] Dempa, *Japan Electronics Almanac 1992*.

as loudspeakers. These are located primarily in Germany, the United Kingdom, and Denmark.

Recording and reproducing systems produced in Europe are sold almost exclusively within the European market, as high wage costs make these products uncompetitive in other markets. However, firms in the less price-sensitive audio components segment export products to North America and elsewhere.

Rest of the World

The Republic of Korea's audio and video equipment industry developed relatively recently, but already it is second to Japan in production volume. The country's products, chiefly VCRs and audio components, are made primarily by the indigenous firms Goldstar, Samsung, and Daewoo.

Taiwan, Hong Kong, and Singapore have been an important source of supply for the industry for over 20 years, as a result of their relatively low wages, their developed commercial infrastructures, and government policies favoring foreign investment. Malaysia and the People's Republic of China have recently become major production locations as well, and Thailand, Indonesia, and India have small but rapidly growing industries. Production in Hong Kong has declined in recent years as production has shifted to China.

In most of these economies, production is carried out primarily in plants owned by major Japanese, European, and Korean firms. Some local companies in Hong Kong, Taiwan, and Singapore serve as OEMs for foreign firms, and many Chinese manufacturing sites are owned or controlled by Hong Kong firms.

Singapore, Malaysia, Thailand, Taiwan, and China are the major Southeast Asian sources of VCRs; Malaysia, Singapore, and China are the major sources of audio tape systems; and Taiwan is the major source of phonograph systems in the region. CD systems were not produced in substantial quantities in Southeast Asia until 1993, when Japanese suppliers shifted some production from Japan to Malaysia in order to reduce production costs as the yen increased in value.[34]

Brazil and Mexico are the remaining major producers of audio and video equipment (table 2). The growth of Brazil's industry was originally encouraged by the protection of the domestic market through tariff and nontariff trade barriers, but these have now largely been lifted. Mexico's industry arose due to the proximity of the U.S. market. Factories in both countries are owned in large part by foreign firms.

[34] *Audio Week*, Oct. 3, 1994, p. 8.

U.S. TRADE MEASURES

Tariff Measures

U.S. imports of audio and video equipment are subject to nominal rates of duty ranging from 3.7 to 4.9 percent (table 3).[35] However, approximately 20 percent of U.S. imports in 1993 entered free of duty under the Generalized System of Preferences (GSP) and other programs of special tariff treatment (Appendix A). Furthermore, since January 1, 1994, imports from Mexico are eligible to enter free of duty in accordance with terms of the North American Free-Trade Agreement (NAFTA).[36] Imports from Canada are currently eligible for reduced tariff rates of 40 percent of the normal nominal rates in accordance with terms of the NAFTA.[37] In 1993 the combined trade-weighted average U.S. duty rate for the products discussed in this summary was approximately 3.2 percent ad valorem.

In the recently concluded GATT Uruguay Round multilateral trade negotiations, the United States agreed to eliminate duties on all products covered by HTS headings 8520 and 8521 and some of those covered by headings 8519 and 8528 (table 3). The United States also agreed to reduce duties to 2.0 percent ad valorem on most products in HTS heading 8522, but it will maintain current duties on all products covered by HTS heading 8518 and some of those covered by other headings. The duty reductions will be phased in over a 5-year period beginning January 1, 1995, or other date to be set by U.S. implementing legislation.

Nontariff Measures

There appear to be no significant nontariff measures affecting U.S. imports of audio and video equipment.

FOREIGN TRADE MEASURES

Tariff Measures

Duty rates for most major U.S. trade partners in audio and video equipment are relatively low and do

[35] The rates of duty reported here, for the U.S. and foreign nations, are the column 1 general rates applied to fellow GATT members and other countries with which a nation has a most-favored-nation (MFN) trade agreement. U.S. column 2 duty rates, applied to other countries, are 35 percent for most products discussed in this summary and 25 percent for television receivers combined with video recording or reproducing apparatus.

[36] Prior to 1994, most imports from Mexico were eligible to enter free of duty under the GSP.

[37] Duties on most imports from Canada have been declining since 1989 under the terms of the U.S.-Canada Free Trade Agreement. These duties will be eliminated entirely as of January 1, 1998.

Table 3
Audio and video equipment: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1994; U.S. exports, 1993; and U.S. imports, 1993

HTS heading or subheading	Description	Col. 1 rate of duty as of Jan. 1, 1994		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				— *Million dollars* —	
8518	Microphones, loudspeakers, headphones, amplifiers, and parts thereof:				
8518.10.00	Microphones and stands therefor	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)	49.2	90.4
8518.21.00	Single loudspeakers, mounted	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)[2]	139.6	129.2
8518.22.00	Multiple loudspeakers, mounted in the same enclosure	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)	90.4	159.5
8518.29.00	Other loudspeakers	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)	184.0	416.0
8518.30.20	Headphones, earphones, and combined microphone/speaker sets[3]	4.9%	Free (A,B,C,CA,E,IL,J,MX)	28.1	157.8
8518.40.20	Audio-frequency electric amplifiers[3]	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)[2]	134.5	247.0
8518.50.00	Electric sound amplifier sets	4.9%	Free (A,B,C,E,IL,J,MX); 1.9% (CA)[2]	99.8	79.8
8518.90.30	Parts[3]	4.9%	Free (A,B,CA,E,IL,J,MX)	125.6	194.5
8519	Sound reproducing apparatus not incorporating a sound recording device:				
8519.10.00	Coin- or token-operated record players	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	12.3	20.8
	Other record players:				
8519.21.00	Without loudspeaker	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	7.4	1.2
8519.29.00	Other	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	27.2	3.0
	Turntables:				
8519.31.00	With automatic record changing mechanism	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	3.4	1.4
8519.39.00	Other	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	3.1	25.9
8519.40.00	Transcribing machines	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	0.4	5.6
	Other sound reproducing apparatus:				
8519.91.00	Cassette type	3.7%	Free (A,B,E,IL,J,MX); 1.4% (CA)[2]	83.2	181.5
8519.99.00	Other[4]	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	72.7	988.4
8520	Magnetic tape recorders and other sound recording apparatus, whether or not incorporating a sound reproducing device:				
8520.10.00	Dictating machines not capable of operating without an external source of power	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	3.8	20.7
	Other magnetic tape recorders incorporating sound reproducing apparatus:[3]				
8520.31.00	Cassette type	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)[2]	28.5	445.1
8520.39.00	Other	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	21.0	21.5
8520.90.00	Other	3.9%	Free (A,B,C,E,IL,J,MX); 1.5% (CA)	34.0	47.2
8521	Video recording or reproducing apparatus, whether or not incorporating a video tuner:				
	Magnetic tape-type:				
	Color, cartridge or cassette type:				
8521.10.30	Not capable of recording	3.9%	Free (A,C,CA,E,IL,J,MX)	62.1	209.0
8521.10.60	Other	3.9%	Free (A*,C,CA,E,IL,J,MX)	(5)	2,670.0
8521.10.90	Other	3.9%	Free (A,C,CA,E,IL,J,MX)	(5)	73.4
8521.90.00	Other	3.7%	Free (CA,E,IL,J,MX)	49.0	177.1

See footnotes at end of table.

Table 3—*Continued*
Audio and video equipment: Harmonized Tariff Schedule subheading; description; U.S. col. 1 rate of duty as of Jan. 1, 1994; U.S. exports, 1993; and U.S. imports, 1993

HTS heading or subheading	Description	Col. 1 rate of duty as of Jan. 1, 1994		U.S. exports, 1993	U.S. imports, 1993
		General	Special[1]		
				— *Million dollars* —	
8522	Parts and accessories of apparatus of headings 8519 to 8521:				
8522.10.00	Pickup cartridges	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)	2.2	4.1
	Other:				
	Assemblies and subassemblies of articles provided for in subheading 8520.90:[3]				
8522.90.25	Printed circuit assemblies	3.9%	Free (A,B,C,E,IL,J,MX); 1.5% (CA)[2]	118.6	5.4
8522.90.35	Other	3.9%	Free (A,B,C,E,IL,J,MX); 1.5% (CA)[2]	([6])	([6])
	Other:				
8522.90.65	Printed circuit assemblies	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)[2]	([6])	303.7
8522.90.75	Other	3.9%	Free (A,B,E,IL,J,MX); 1.5% (CA)[2]	([6])	([7])
8528.10	Television receivers, color:				
8528.10.04	Incomplete or unfinished, not incorporating a display device, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	50.1	240.4
8528.10.14	Non-high definition, having a single picture tube (non-projection type), with a video display diagonal not exceeding 35.56 cm, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.24	Non-high definition, having a single picture tube (non-projection type), with a video display diagonal exceeding 35.56 cm, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.34	Non-high definition, projection type, with a cathode ray tube, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.44	High definition, non-projection type, with a cathode ray tube, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.54	High definition, projection type, with a cathode ray tube, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.64	With a flat panel screen, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])
8528.10.74	Other, incorporating video recording or reproducing apparatus	3.9%	Free (A,E,IL,J,MX); 1.5% (CA)	([8])	([8])

[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 or A*); Automotive Products Trade Act (B); Agreement on Trade in Civil Aircraft (C); North American Free-Trade Agreement, goods of Canada (CA) and Mexico (MX); Caribbean Basin Economic Recovery Act (E); United States-Israel Free-Trade Area (IL); and Andean Trade Preference Act (J).

[2] Certain products from Canada under these subheadings enter free of duty under provisions of HTS subheadings 9905.00.00, 9905.85.53, 9905.85.59, and 9905.85.61.

[3] Not including telephone answering machines or devices used in telephone headsets or repeaters.

[4] Includes CD players.

[5] Value included under HTS subheading 8521.10.30.

[6] Value included under HTS subheading 8522.90.25.

[7] Value included under HTS subheading 8522.90.65.

[8] Value included under HTS subheading 8528.10.04.

Source: USITC, *Harmonized Tariff Schedule of the United States* (1994). Exports and imports compiled from official statistics of the U.S. Department of Commerce.

not constitute a major trade barrier for U.S. exporters. The most important export markets for U.S. suppliers of audio and video equipment are in Europe, the Americas, and parts of East Asia. European Union (EU) duty rates on audio and video equipment range from 4.9 percent ad valorem on loudspeakers, microphones, and amplifiers to 14 percent on video recorders and players.[38] Most U.S. exports to the EU are subject to the lower duty rate. Canadian tariffs on U.S. exports of audio and video equipment currently range from 0 percent on phonograph and CD equipment to 4.1 percent ad valorem on certain audio components.[39] Mexican duty rates on most of these U.S. exports were eliminated immediately upon implementation of the NAFTA on January 1, 1994, and other rates are being reduced to zero over a five-year period. Japan, Hong Kong, and Singapore have no tariffs on these items.[40] Brazilian tariffs range from 20 to 30 percent ad valorem on audio and video products, forming an important barrier to U.S. exports to this country.

In the recently concluded GATT Uruguay Round multilateral trade negotiations, the EU agreed to reduce its duty rates to between 2 and 14 percent ad valorem and Brazil agreed to limit its duty rates to 25 percent ad valorem.

Nontariff Measures

There appear to be no significant nontariff measures applied specifically to audio and video equipment in major U.S. export markets. Certification of conformance to national and regional product standards in Europe and Japan, for example, is carried out using transparent, non-discriminatory procedures.[41]

It is possible that standards could become a de facto nontariff barrier in the future if EU members and other European countries proceed with proposals to require compliance with the ISO 9000 series of manufacturing quality standards.[42] Due to the cost of achieving compliance and receiving certification, this would be particularly burdensome to smaller U.S. producers of specialist audio equipment, and it may induce some suppliers to forgo further participation in the European market. Certification for meeting the standards is done at the level of the individual manufacturing facility. Initial certification costs an estimated $20,000 to $30,000, and annual maintenance of certification costs an estimated $8,000 to $10,000.

In October 1992, Brazil ended its requirement for import licenses for electronic products. This requirement had limited Brazil's imports of audio and video equipment. China enforces an embargo on imports of audio tape recorders and other products, but U.S. suppliers are not competitive in world markets for these products. Exports to Japan may be hindered by structural rigidities in the country's distribution system,[43] but the size and competitive strength of Japan's domestic audio and video equipment industry make it unlikely that U.S. suppliers could have gained a much larger share of the market in any case.

U.S. MARKET

Consumption

Annual U.S. consumption of audio and video equipment varied between $6.7 billion and $8.0 billion during the period 1989-93, with an upward trend for 1990-93 (table 4, figure 2).[44] In view of declining prices of this equipment over the period, consumption appears to have increased substantially in quantitative terms.

Imports as a share of consumption rose during 1989-92 from a level of 84 percent to a level of 87 percent for the category as a whole. However, import penetration was substantially lower for such audio components as loudspeakers, microphones, and amplifiers than for recording and reproducing systems. For audio components, imports as a share of consumption rose from 46 percent in 1989 to 53 percent in 1993. By contrast, the ratio of imports to consumption for complete systems rose from approximately 102 percent in 1989 to 105 percent in 1993. The reason that imports exceeded consumption for these products appears to be that some of these imports were subsequently reexported.[45]

The difference in import penetration levels between audio components and recording and reproducing systems appears to be due to a difference in the conditions of competition. As discussed above,

[38] Certain parts and accessories have EU duty rates of 0 or 3.8 percent.

[39] Canadian MFN tariffs for countries other than the United States range from 0 to 10.3 percent ad valorem.

[40] Japan's tariff schedule lists a 4.2 percent ad valorem duty rate on nearly all the equipment covered here, but these rates are "temporarily" suspended. In the recently concluded GATT Uruguay Round multilateral trade negotiations, Japan agreed to eliminate these duties permanently.

[41] USITC staff interviews with officials of U.S. loudspeaker and recording equipment manufacturers, Oct. 12, 1993 and Oct. 13, 1994.

[42] See "ISO 9000 Gains Momentum with U.S. Makers," *Asian Sources of Electronics*, July 1993, pp. 64-68.

[43] USITC, *Phase I: Japan's Distribution System and Options for Improving U.S. Access* (investigation No. 332-283) USITC publication 2291, June 1990; and USITC, *Phase II: Japan's Distribution System and Options for Improving U.S. Access* (investigation No. 332-283), USITC publication 2327, Oct. 1990.

[44] These consumption figures reflect some double counting, because they include both audio components and audio systems that include those components.

[45] See the discussion in the section on exports below.

Table 4
Audio and video equipment: U.S. shipments, exports of domestic merchandise, imports for consumption, and apparent U.S. consumption, by industry segment, 1989-93

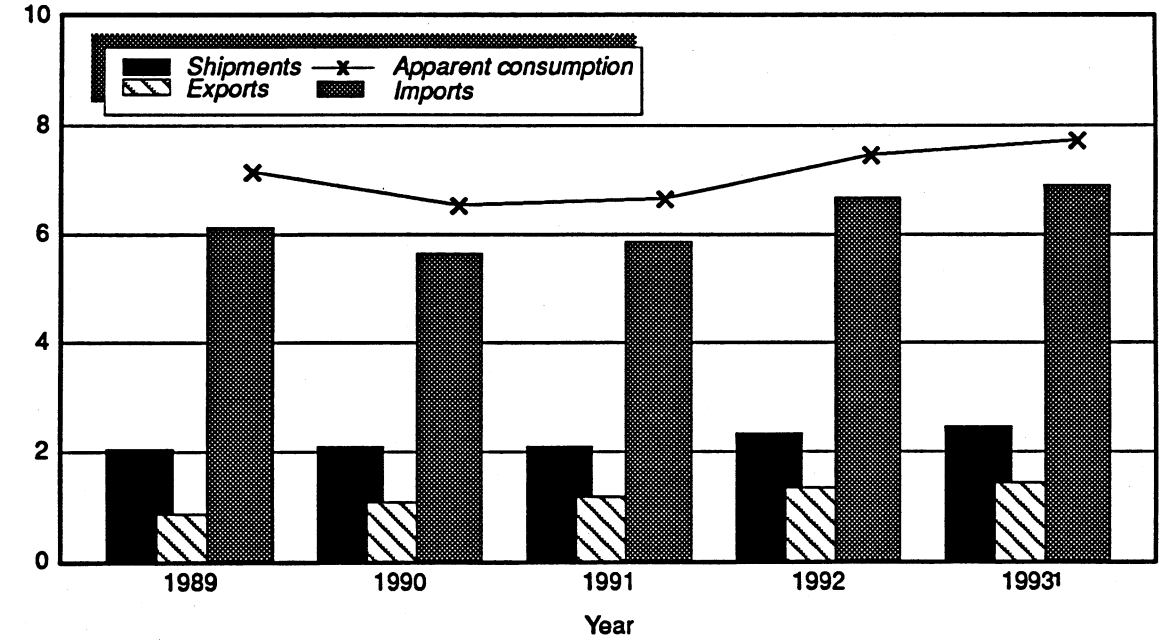
Year	U.S shipments	U.S exports	U.S imports	Apparent U.S. consumption	Ratio of imports to consumption
		Millions of dollars			*Percent*
Recording and reproducing systems:					
1989	302	408	5,012	4,906	100.0
1990	366	501	4,537	4,401	100.0
1991	324	516	4,809	4,618	100.0
1992	384	627	5,444	5,201	100.0
1993	[1]311	579	5,445	5,177	100.0
Audio components:					
1989	1,757	463	1,121	2,415	46.4
1990	1,734	582	1,121	2,273	49.3
1991	1,779	669	1,070	2,181	49.1
1992	1,946	720	1,241	2,467	50.3
1993	[1]2,156	851	1,473	2,778	53.0
Total:					
1989	2,059	871	6,132	7,321	83.8
1990	2,100	1,083	5,657	6,674	84.8
1991	2,104	1,184	5,879	6,799	86.5
1992	2,330	1,347	6,685	7,668	87.2
1993	[1]2,466	1,430	6,918	7,955	87.0

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

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

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

Figure 2
Audio and video equipment: U.S. shipments, exports, imports, and apparent consumption, 1989-93
Billion dollars



[1] 1993 shipments estimated by staff of the U.S. International Trade Commission.

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

recording and reproducing systems are primarily commodity products in which suppliers compete on the basis of price. Many audio components, on the other hand, are specialty products in which suppliers compete on the basis of quality and performance as well as price. Therefore, the cost disadvantage of U.S. suppliers compared to Asian suppliers has had a much larger effect in recording and reproducing systems than in audio components.

Production

U.S. shipments of audio and video equipment rose from $2.1 billion in 1989 to $2.5 billion in 1993, an increase of 20 percent over the period (table 4).[46] Audio components comprised 85 percent of these shipments in 1989 and 87 percent, or $2.2 billion, in 1993 (figure 3). By contrast, recording and reproducing systems shipments were approximately $300 million in 1993. Annual shipments of audio components increased 23 percent during 1989-93, whereas shipments of recording and reproducing systems were approximately the same at the beginning and end of the period. When parts of these systems are excluded, U.S. production declined by approximately 30 percent during 1989-93. The principal reasons for these relative shifts appear to be, first, increasing domestic and foreign demand for high-performance loudspeakers and other audio components produced by leading U.S. firms and, second, the transfer of foreign-owned consumer VCR production to low-wage Asian countries.

Imports

U.S. imports of audio and video equipment rose from $6.1 billion in 1989 to $6.9 billion in 1993, an increase of 13 percent (table 5). In contrast to U.S. domestic production, imports were dominated by recording and reproducing systems, which composed approximately 78 to 82 percent of imports throughout the period (figure 4). Imported audio components were primarily low-end, commodity products, but some high-end products were imported as well.

The largest single source of imports throughout the period was Japan (table 5). However, the relative importance of Japan as a source diminished over the period as the share of U.S. imports coming from Japan declined from 62 percent in 1989 to 42 percent in 1993. Eight of the nine leading import sources in 1993 were East Asian economies. The most rapidly growing source between 1989 and 1993 was Malaysia, where Japanese, Korean, and European firms have recently built manufacturing plants. Malaysia supplied less than 1 percent of U.S. imports in 1989, but by 1993 it supplied 14 percent, replacing Korea as the second largest source for U.S. imports.[47]

The principal importers of audio and video equipment are U.S. subsidiaries of Japanese and Korean manufacturing firms, U.S. and European electronics firms that source products on an OEM basis, and U.S. retailers that source house-brand products on an OEM basis.

In addition to imports of foreign audio and video equipment, the United States also had reimports of $206 million in 1993 of products assembled from U.S. components. The U.S. domestic content of these products was $48 million, with $157 million in foreign value added. Approximately 87 percent of these products, primarily audio components and audio tape recorders, were assembled in Mexico. Assembly of electronic products in Mexico is likely to increase as a result of implementation of the NAFTA. Increased electronics imports from Mexico should be largely the result of a diversion of trade from sources in low-wage Asian countries.[48]

FOREIGN MARKETS

Foreign Market Profile

Western Europe represents approximately 40 percent of the total non-U.S. market for audio and video recording and reproducing equipment, and Japan represents approximately 30 percent.[49] U.S. suppliers have a negligible share of foreign markets in the commoditized, price-competitive segments of the industry, particularly recording and reproducing systems and low-end audio components. However, U.S. suppliers are competitive in foreign markets for high-end, specialized audio components, particularly loudspeakers. Such U.S. firms as Bose and Harman have a substantial share of the high-end loudspeaker market in Canada, Japan, and much of Western

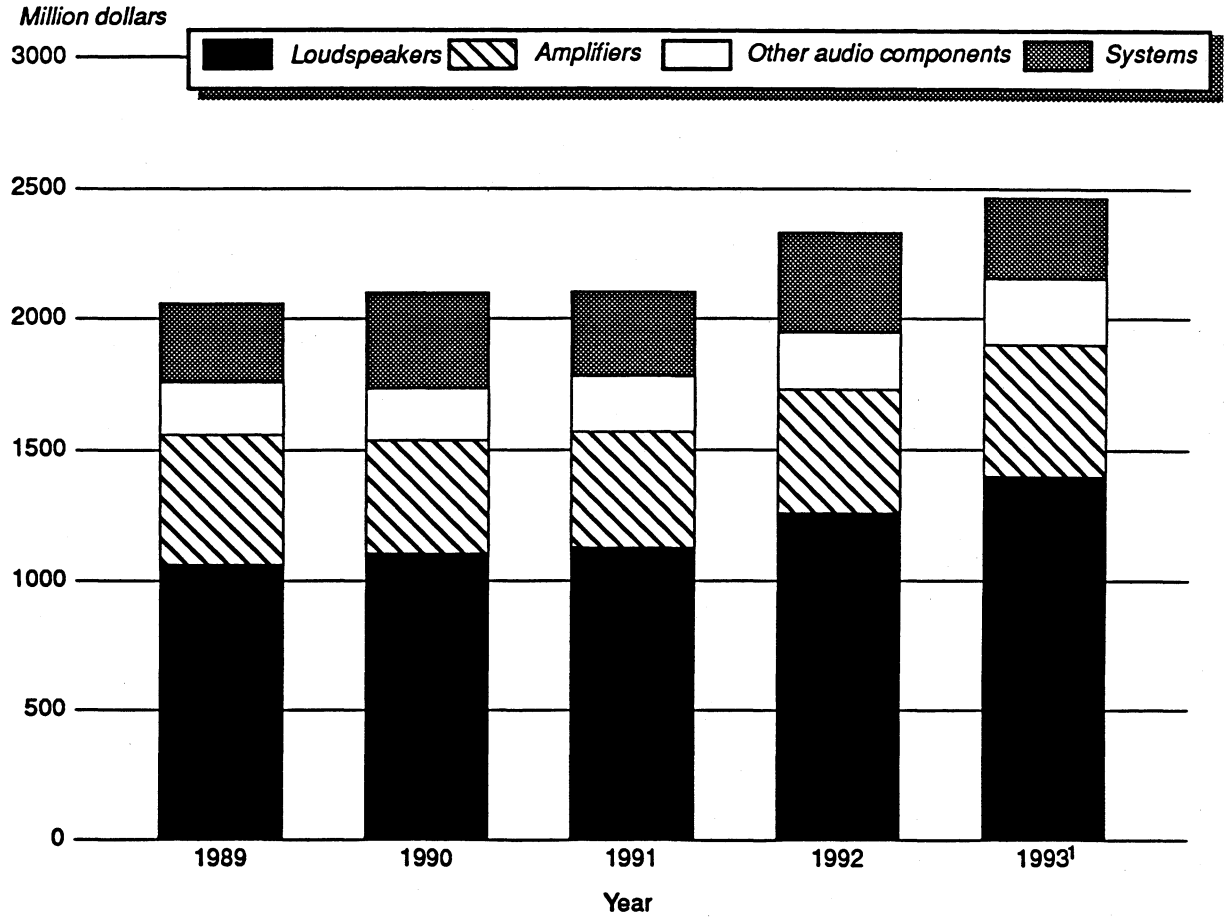
[46] Official statistics of the U.S. Department of Commerce cover factory shipments, not production per se. Shipments and production differ by the amount of changes in producer inventories. Information on inventory changes is not available at the level of the specific products discussed in this report. However, inventories for SIC industry 3651, Household audio and video equipment, which includes television and radio receivers in addition to most of the products discussed in this report, varied by less than $11 million per year during 1989-91 (U.S. Department of Commerce, *Annual Survey of Manufactures*, 1989, 1990, 1991).

[47] Malaysia's relative importance as a source for U.S. imports continued to increase during early 1994. Twenty-three percent (by value) of U.S. CD player imports during the first seven months of 1994 were from Malaysia, up from less than 5 percent a year earlier. Japan's share declined from 79 percent to 56 percent over the same period.

[48] USITC, *Potential Impact on the U.S. Economy and Selected Industries of the North American Free Trade Agreement* (investigation No. 332-337), USITC publication 2596, Jan. 1993, p. 5-2.

[49] Estimated from Elsevier, *Yearbook of World Electronics Data.*

Figure 3
Audio and video equipment: U.S. shipments, by industry segment, 1989-93



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

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

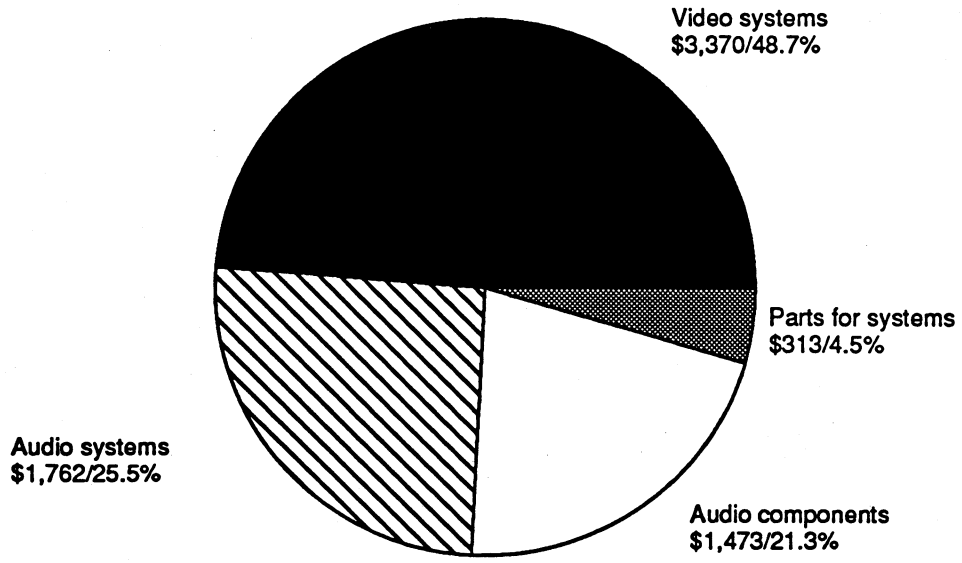
Table 5
Audio and video equipment: U.S. imports for consumption, by principal sources, 1989-93

Source	1989	1990	1991	1992	1993
			Value (1,000 dollars)		
Japan	3,817,404	3,433,754	3,160,736	3,252,556	2,885,785
Malaysia	54,907	150,848	415,182	656,599	986,427
Korea	802,603	575,906	718,000	825,616	844,832
China	134,836	141,826	179,102	244,791	439,274
Taiwan	501,560	372,260	358,850	359,551	363,188
Mexico	178,658	230,012	251,238	249,988	294,200
Indonesia	1,252	2,888	12,333	151,119	269,090
Singapore	146,345	185,964	184,342	204,633	267,752
Thailand	129,962	238,858	275,027	387,743	199,464
United Kingdom	53,447	66,804	65,152	62,312	79,310
All other	311,084	258,043	259,469	290,271	289,159
Total	6,132,057	5,657,160	5,879,432	6,685,179	6,918,480

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

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

Figure 4
Audio and video equipment: U.S. imports for consumption, by industry segment, 1993



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

Europe. Reportedly, these two firms lead the market for loudspeaker systems sold under brand names in Japan.[50] Furthermore, several smaller U.S. loudspeaker producers export half or more of their shipments to Taiwan and other East Asian markets. These firms have increased their exports substantially in recent years, partly as a result of increased attention to customer tastes in the style of loudspeaker cabinets.[51]

U.S. Exports

Reported U.S. exports of audio and video equipment increased by over 60 percent from $0.9 billion in 1989 to $1.4 billion in 1993 (table 6). The ratio of exports to U.S. shipments rose from 42 percent to 58 percent during this period. For audio components, exports amounted to 39 percent of shipments in 1993. For recording and reproducing systems, exports exceeded 100 percent of shipments, suggesting that reported exports included reexports of foreign products.[52] Audio components comprised 55 to 60 percent of reported exports throughout 1989-93, with loudspeakers alone accounting for 25 to 29 percent of the total (figure 5).

For most of the period, Canada and Mexico were the largest export markets both for audio and video equipment as a whole and for audio components (table 6). Japan was the second or third largest market each year except 1992. Brazil's emergence as a large export market in 1992 was due entirely to sales of parts and accessories for recording and reproducing systems, apparently to support growing Brazilian production of these systems. The other leading markets were primarily in Western Europe or East Asia. The principal exporters for this equipment were U.S. manufacturers selling to foreign distributors.

U.S. TRADE BALANCE

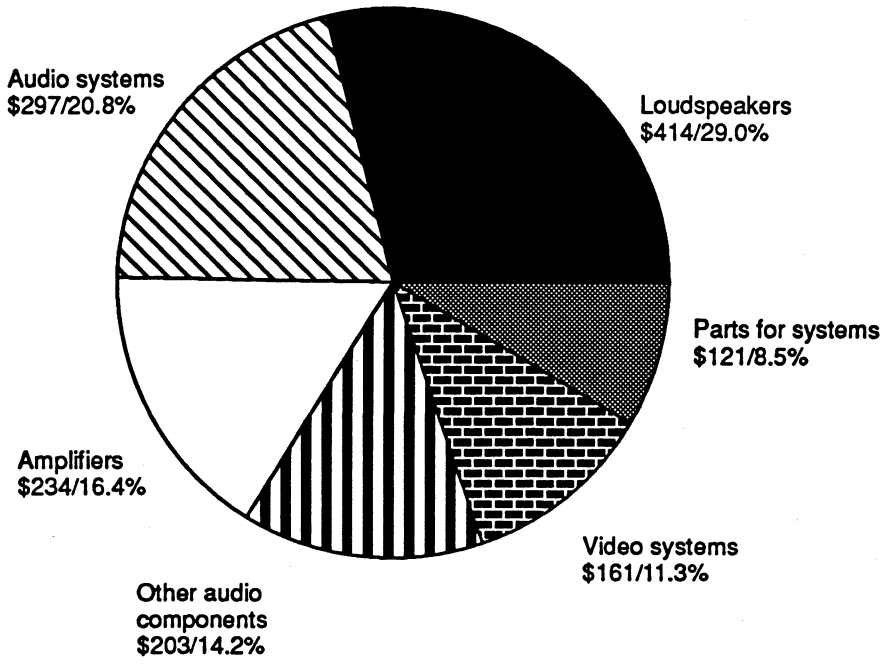
The United States had annual trade deficits in audio and video equipment of between $4.6 billion and $5.5 billion throughout 1989-93, with a decline in the deficit between 1989 and 1990 and annual increases since then (table 7). Japan's share of the total deficit declined from 70 percent in 1989 to 50 percent in 1993. In 1993, the United States had deficits with 9 of its 10 leading trading partners in the industry. Mexico and Canada were the only non-Asian countries among these leading trading partners.

[50] USITC staff interview with official of a leading U.S. loudspeaker manufacturer, Oct. 12, 1993.

[51] USITC staff interviews with industry participants at the Winter Consumer Electronics Show, Las Vegas, NV, Jan. 8, 1994.

[52] The export statistics reported here are intended to represent domestic products only. However, statistical analysts at the U.S. Department of Commerce confirm that some reported exports appear not to represent domestic products (USITC staff interview, June 17, 1994). It is also possible that some of these exports are U.S. products reported under the wrong classification.

Figure 5
Audio and video equipment: U.S. exports of domestic merchandise, by industry segment, 1993



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

Table 6
Audio and video equipment: U.S. exports of domestic merchandise, by principal markets, 1989-93

Market	1989	1990	1991	1992	1993
			Value (1,000 dollars)		
Mexico	156,517	203,204	196,992	207,728	240,033
Canada	92,674	183,576	197,827	203,527	231,274
Japan	135,110	140,617	130,728	122,282	126,270
Hong Kong	33,193	27,690	40,916	49,903	76,201
Germany[1]	42,803	53,200	67,264	70,382	74,760
United Kingdom	62,391	62,036	69,106	54,241	61,122
Brazil	10,116	15,942	15,036	122,446	59,689
Singapore	21,520	34,314	36,394	38,830	52,742
Netherlands	24,028	32,680	34,126	44,231	42,124
Venezuela	6,134	14,904	26,730	38,340	40,652
All other	286,339	315,113	369,360	395,124	425,305
Total	870,826	1,083,276	1,184,479	1,347,034	1,430,170

[1] The former German Democratic Republic (East Germany) is included throughout the period.

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

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

Table 7
Audio and video equipment: U.S. exports of domestic merchandise, imports for consumption, and merchandise trade balance, by selected countries and country groups, 1989-93[1]

(Million dollars)

Item	1989	1990	1991	1992	1993
U.S. exports of domestic merchandise:					
Japan	135	141	131	122	126
Malaysia	2	2	4	3	3
Korea	16	17	23	28	38
Mexico	157	203	197	208	240
China	1	2	3	4	8
Taiwan	28	26	26	31	34
Singapore	22	34	36	39	53
Canada	93	184	198	204	231
Indonesia	0	2	2	1	2
Thailand	4	6	6	6	7
All other	414	466	560	702	689
Total	871	1,083	1,184	1,347	1,430
ASEAN	30	46	50	54	68
European Union	222	259	289	303	305
U.S. imports for consumption:					
Japan	3,817	3,434	3,161	3,253	2,886
Malaysia	55	151	415	657	986
Korea	803	576	718	826	845
Mexico	179	230	251	250	294
China	135	142	179	245	439
Taiwan	502	372	359	360	363
Singapore	146	186	184	205	268
Canada	41	33	38	36	50
Indonesia	1	3	12	151	269
Thailand	130	239	275	388	199
All other	324	292	287	317	318
Total	6,132	5,657	5,879	6,685	6,918
ASEAN	339	586	893	1,406	1,732
European Union	170	173	163	206	232
U.S. merchandise trade balance:					
Japan	-3,682	-3,293	-3,030	-3,130	-2,760
Malaysia	-53	-149	-411	-653	-983
Korea	-787	-559	-695	-798	-807
Mexico	-22	-27	-54	-42	-54
China	-134	-140	-176	-241	-432
Taiwan	-474	-346	-333	-328	-329
Singapore	-125	-152	-148	-166	-215
Canada	52	151	160	168	181
Indonesia	-1	-1	-11	-150	-268
Thailand	-126	-233	-270	-382	-193
All other	90	174	273	385	371
Total	-5,261	-4,574	-4,695	-5,338	-5,488
ASEAN	-309	-540	-843	-1,352	-1,664
European Union	52	86	125	97	73

[1] Import values are based on customs value; export values are based on f.a.s. value, U.S. port of export.

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

Note.—The countries shown are those with the largest total U.S. trade (U.S. imports plus exports) in these products in 1993.

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

APPENDIX A
EXPLANATION OF 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 upon 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 nonembargoed countries except those enumerated in general note 3(b) to the HTS—Afghanistan, Azerbaijan, Cuba, Kampuchea, Laos, North Korea, and Vietnam—whose goods are dutiable at the rates set forth in ***column 2***. Goods from Albania, Armenia, Belarus, Bosnia, Bulgaria, the People's Republic of China, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Poland, Romania, Russia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan are now eligible for MFN treatment. Among goods 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. Where eligibility for special tariff treatment is not claimed or established, goods are dutiable at column 1-general rates.

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 September 30, 1994. Indicated by the symbol "A" or "A*" in the special subcolumn of column 1, the GSP provides duty-free entry to eligible articles the product of and imported directly from designated beneficiary developing countries, as set forth in general note 4 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, and reduced-duty treatment to certain other articles, which are the product of and imported directly from designated countries, as set forth in general note 7 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 (IFTA), as provided in general note 8 to the HTS. Where 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 nonreciprocal duty-free or reduced-duty treatment in the special subcolumn of column 1 followed by the symbol "J" or "J*" in parentheses is afforded to eligible articles the product of designated beneficiary countries under the ***Andean Trade Preference Act*** (ATPA), enacted in title II of Public Law 102-182 and implemented by Presidential Proclamation 6455 of July 2, 1992 (effective July 22, 1992), as set forth in general note 11 to the HTS.

Preferential rates of duty in the special subcolumn of column 1 followed by the symbol "CA" are applicable to eligible goods of Canada, and those followed by the symbol "MX" are applicable to eligible goods of Mexico, under the ***North American Free Trade Agreement***, as provided in general note 12 to the HTS, effective January 1, 1994.

Other special tariff treatment applies to particular ***products of insular possessions*** (general note 3(a)(iv)), goods covered by the ***Automotive Products Trade Act*** (APTA) (general note 5) and the ***Agreement on Trade in Civil Aircraft*** (ATCA) (general note 6), and ***articles imported from freely associated states*** (general note 10).

The ***General Agreement on Tariffs and Trade*** (GATT) (61 Stat. (pt. 5) A58; 8 UST (pt. 2) 1786) is a multilateral agreement setting forth basic principles governing international trade among its

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, antidumping 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 and other vegetable fibers, wool, man-made fibers and silk blends, 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 many supplying countries, including the four largest suppliers: China, Hong Kong, the Republic of Korea, and Taiwan.