

UNITED STATES TARIFF COMMISSION

ELECTRONIC RECEIVING TUBES AND MOUNTS:
WORKERS OF THE TELL CITY, IND., PLANT
OF GENERAL ELECTRIC CO.

Report to the President
on Investigation No. TEA-W-239
Under Section 301(c)(2) of the Trade Expansion Act of 1962



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UNITED STATES TARIFF COMMISSION

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REPORT TO THE PRESIDENT

U.S. Tariff Commission,
September 23, 1974.

To the President:

In accordance with sections 301 (f)(1) and (f)(3) of the Trade Expansion Act of 1962 (TEA) (19 U.S.C. 1901), the U.S. Tariff Commission herein reports the results of investigation No. TEA-W-239 made under section 301(c)(2) of the act to determine whether, as a result in major part of concessions granted under trade agreements, articles like or directly competitive with electronic receiving tubes and components thereof known as mounts (of the types provided for in item 687.60 of the Tariff Schedules of the United States (TSUS)) produced by the Tell City, Ind., plant of the General Electric Co., New York, N.Y., are being imported into the United States in such increased quantities as to cause, or threaten to cause, the unemployment or underemployment of a significant number or proportion of the workers of such firm or an appropriate subdivision thereof.

The investigation was instituted on July 30, 1974, on the basis of a petition for adjustment assistance filed under section 301(a)(2) of the act on behalf of the workers and former workers of the Tell City, Ind., plant of the General Electric Co. The petition was received on July 24, 1974.

Notice of the investigation was published in the Federal Register (39 F.R. 28194) on August 5, 1974. No public hearing was requested, and none was held.

The information in this report was obtained from the General Electric Co., other domestic producers, importers, users of the aforementioned articles, trade associations, the petitioners, and the Commission's files.

On January 4, 1974, the Commission reported the results of investigation No. TEA-W-217 pursuant to sections 301(f)(1) and (f)(3) of the Trade Expansion Act. In that investigation, the Commission found (Commissioners Leonard and Young dissenting and Vice Chairman Parker not participating) that the workers of the Owensboro, Ky., plant of the General Electric Co. producing electronic receiving tubes and components thereof known as mounts were eligible to apply for adjustment assistance.

Finding of the Commission

On the basis of its investigation, the Commission finds (Vice Chairman Parker and Commissioner Leonard dissenting) that articles like or directly competitive with electronic receiving tubes and components thereof known as mounts (of the types provided for in item 687.60 of the Tariff Schedules of the United States) produced by the Tell City, Ind., plant of the General Electric Co., New York, N. Y., are, as a result in major part of concessions granted under trade agreements, being imported into the United States in such increased quantities as to cause unemployment or underemployment of a significant number or proportion of the workers of such firm or an appropriate subdivision thereof.

Views of Commissioner Moore and Commissioner Ablondi 1/

This investigation relates to a petition filed on behalf of the workers and former workers of the Tell City, Ind. , plant of the General Electric Co. (GE) for a determination under section 301 of the Trade Expansion Act of 1962 of their eligibility to apply for adjustment assistance.

The petitioning workers have been engaged in the manufacture of electronic receiving tubes and electronic receiving tube mounts. The petitioners contend as a result in major part of concessions granted under trade agreements, articles like or directly competitive with the articles produced by the workers' firm are being imported into the United States in such increased quantities as to cause, or threaten to cause, unemployment or underemployment of a significant number or proportion of the workers of the firm.

Under the Trade Expansion Act of 1962, four criteria must be met in order for an affirmative decision to be made. These criteria are as follows:

- (1) Imports of an article like or directly competitive with an article produced by the petitioning workers must be increasing;
- (2) The increase in imports must be a result in major part of trade-agreement concessions;
- (3) A significant number or proportion of the workers concerned are unemployed or underemployed, or threatened with unemployment or underemployment; and
- (4) The concession-generated increased imports must be the major factor in causing or threatening to cause the unemployment or underemployment.

1/ Chairman Bedell concurs in the result.

In this instance, it is our judgment that each of the four criteria outlined above has been met.

The facts developed during this investigation are almost identical with those in earlier cases, Workers of the Owensboro, Ky., Plant of General Electric Co.: . . . Investigation No. TEA-W-217 . . ., TC Publication 637, 1974, and Workers of the Woodbridge, N.J., Plant of RCA Corp.: . . . Investigation No. TEA-W-234 . . ., TC Publication 679, 1974. A discussion of the facts developed during the investigation of the instant GE case with reference to each of the four criteria follows:

Increased imports

Total imports of electronic receiving tubes, including those imported as components of television receivers, and of tube mounts which are further processed into receiving tubes in the United States, have increased from * * * million units in 1968 to * * * million units in 1973--a * * * percent increase.

Imports of receiving tubes and tube mounts as separate articles have increased from * * * million units in 1968 to * * * million units in 1973--a * * * percent increase.

In major part

The second requirement of the act is that increased imports have resulted in major part from trade-agreement concessions. The rate of duty on electronic receiving tubes and mounts has been reduced from 35 percent ad valorem in 1930 to 6 percent in 1972 as the result of trade-agreement concessions.

The duty reduction represented by trade-agreement concessions was sufficiently large so as to provide an incentive for increased imports. These concessions from 1930 duty rate increased the average unit profit of foreign production over domestic production by an estimated * * * percent.

Unemployment and threat thereof

This criterion has also been met. The average annual number of production and related workers engaged in the production of electronic receiving tubes and mounts during 1969-73 in the Tell City plant decreased each year from * * * in 1969 to * * * in 1973. This decrease continued in 1974 and in June the average number of such workers was * * *. GE plans to close the Tell City facility in 1975. In view of the foregoing, it is clear that a significant number of workers have been unemployed or underemployed, or threatened with unemployment or underemployment, within the meaning of the statute.

Major factor

The fourth criterion is that concession-generated increased imports are the major factor causing or threatening to cause the unemployment or underemployment of the workers at the Tell City plant. A direct relationship exists between the increased imports of receiving tubes and mounts and the unemployment of such workers. Domestic production of tubes and mounts is controlled by three highly competitive producers. Electronic tubes and mounts are interchangeable and are sold on the basis of price. As GE's competitors increased

their concession-generated imports, the company was forced to meet its competition by changing its production plans and increasing its own foreign manufacturing, adversely affecting domestic employment and causing or threatening to cause increased unemployment. In order to meet the competition of foreign imports, GE was forced to curtail domestic production of tubes and tube mounts and increase its imports. Accordingly, we conclude that the concession-generated increased imports have been the major factor in causing the unemployment of the workers concerned.

Conclusion

Since we find that all the statutory requirements are met, we conclude that the electronic receiving tube and mount workers at the Tell City, Ind., plant of the General Electric Co., who are unemployed or underemployed are eligible to apply for adjustment assistance.

View of Vice Chairman Parker

This investigation relates to a petition filed on behalf of workers at the Tell City, Ind., plant of the General Electric Co., for a determination as to their eligibility to apply for adjustment assistance. The petitioning workers have been engaged primarily in the manufacture of electronic receiving tubes and electronic receiving tube mounts; mounts generally consist of the internal parts of tubes assembled on a glass disc before being sealed in a glass or metal envelope.

Major duty reductions on receiving tubes and mounts occurred during the period 1930-48 when the duty was reduced from 35 percent ad valorem to 12.5 percent ad valorem. Beginning in 1968, the 12.5 percent ad valorem rate was reduced, over a 5-year period, to the present 6 percent ad valorem. These rate reductions do not appear to have had any measurable effect on changes in the importation of the subject products. Moreover, in recent years, nearly all imported electronic receiving tube mounts were imported under the provisions of tariff items 806.30 and 807.00. Item 806.30 provides that articles of metal manufactured in the United States exported for processing and returned to the United States for further processing are subject to duty only on the value of the foreign processing. Item 807.00 provides that imported articles assembled in foreign countries with fabricated components that have been manufactured in the United States are subject to import duty on the full value of the imported article less the value of the U.S. components contained therein. No further processing in the United States is

required for articles imported under item 807.00. Although trade-agreement duty concessions may modify the tariff rate on a product imported under item 806.30 and 807.00, the duty allowances for the value or cost of U.S. processing or the cost of components manufactured in the United States are not a trade-agreement concession within the meaning of the Trade Expansion Act of 1962.

At present, the principal market for receiving tubes and mounts is for replacement of used tubes in television receivers. Technological advances in solid state transistors, diodes and integrated circuits have greatly reduced the demand for, and use of, receiving tubes and mounts. During the period, 1969-73, domestic consumption and domestic shipments of receiving tubes have decreased nearly 40 percent and imports nearly 17 percent.

The general decline in both the use and the market demand for receiving tubes was foreseen by the management of General Electric several years ago and the company announced, in 1965, that the receiving tube operations at the Tell City plant would be relocated to the Owensboro, Kentucky, plant to consolidate its remaining production of these articles. Thus, the major cause of unemployment at Tell City appears to be the result of a management decision to consolidate. The mounts imported by GE did not dislocate workers of the Tell City plant as the mounts manufactured abroad and imported by GE are not of the tube type manufactured at the Tell City plant and were not used in substitution for the type of mounts being produced at that plant.

The importation of tube mounts by domestic manufacturers of electronic tubes appears to have enabled these producers to maintain their electronic tube production in the United States, although at reduced levels due to declining demand; moreover, the importation of mounts has enabled these producers to export completed tubes from the United States.

For the above-cited reasons, I have determined that as a result in major part of concessions granted under trade agreements, an article like or directly competitive with an article produced by the workers at the Tell City plant is not being imported into the United States in such increased quantities as to cause, or threaten to cause, unemployment or underemployment of a significant number or proportion of the workers of this subdivision of the petitioning workers' firm.

View of Commissioner Leonard

My determination in the instant case is negative because one of the statutory criteria has not been met, i. e., that the increase in imports of articles like or directly competitive with electronic receiving tubes and components thereof known as mounts produced by the General Electric Co., Tell City, Ind., is the result in major part of concessions granted under trade agreements. My reasoning in support of this determination is set forth in my statement in an earlier Commission investigation under the Trade Expansion Act. 1/

1/ Electronic Receiving Tubes and Mounts: Workers of the Owensboro, Ky., Plant of General Electric Co., . . . Investigation No. TEA-W-217 . . . , TC Publication 637, January 1974, pp. 7-9.

INFORMATION OBTAINED IN THE INVESTIGATION

Description and Uses

In recent years the Tell City, Ind., plant of General Electric Co. (GE) has produced electronic receiving tubes and mounts and specialty motors. The petition for adjustment assistance was filed on behalf of the workers employed or formerly employed in the manufacture of tubes and mounts. There have been no layoffs of workers engaged in the manufacture of specialty motors.

Electronic receiving tube mounts are consumed in electronic receiving tubes, which in turn, are today utilized primarily in television receivers. The basic components of an electronic receiving tube are the mount, a glass or metal envelope, and, for some types, a phenolic base. The mount is a round, flat glass disc to which the functioning elements of the tube have been attached. These elements are the cathode(s), plate(s), grid(s), and filament(s), as well as such accessory parts as getters, metal-heat dissipating shields, and contacts for external connections. The tube is completed by placing a glass or metal envelope over the mounts, sealing the envelope to the base, exhausting the air from the interior to create a vacuum, and, if required, attaching the base to the glass disc previously described. These finishing operations are highly automated.

The manufacture of the mount components requires a number of machine operations, such as stamping mica spacers and metal parts and winding fine coils to form grids. Assembling the components requires numerous meticulous operations, such as welding fine

wire connections. For those mounts produced in large volume, a high degree of mechanization is possible. However, setting up automatic machinery for long production runs is both time consuming and costly and is often accompanied by a high rejection rate during initial assembly. Some operations are extremely difficult to automate, and mounts made in limited quantities are usually assembled more economically by hand. In general, mounts assembled in domestic facilities, such as GE's Tell City plant, require the least amount of labor. Mounts which are highly labor intensive are typically assembled in foreign facilities operated by U.S. producers, an example of which is GE's plant in Singapore.

In recent years, technological advances in solid-state semiconductor components, beginning with diodes and transistors and followed by integrated circuits, have permitted these devices to replace electronic receiving tubes in an ever-increasing number of applications. These articles are not made in GE's Tell City or Owensboro plants--the two domestic plants of the Tube Products Department which is responsible for the manufacture of electronic receiving tube mounts and tubes.

Diodes include most semiconductors having two terminals; i. e., rectifiers, signal diodes, and switches. 1/ A transistor is most

1/ Rectifiers convert an alternating current signal to a direct current signal. Some rectifiers, such as thyristors, have three or more terminals. Signal diodes perform many functions depending upon their voltage-current characteristics; e. g., tunnel diodes may be used as detectors, amplifiers, or switches in electronic circuits. Switches are used to permit or inhibit the movement of an electronic signal; they may have two or more terminals, and one switch may provide many switching functions.

often a three-terminal device which performs most functions of a diode but is frequently used for signal amplification. Integrated circuits, which include small-, medium-, and large-scale integration arrays, may consist of both active and passive components integrated on a single substrate. Integrated circuits may function as, or include the functions of, thousands of diodes, transistors, resistors, capacitors, and inductors.

Semiconductor diodes, transistors, and integrated circuits have already displaced receiving tubes and other electronic components in many applications, such as most consumer electronic products, computers, communications equipment, industrial controls, and military electronic equipment. However, receiving tubes continue to be used, largely in high-voltage or high-current circuits and as replacements in previously produced equipment which utilize receiving tubes. The largest market for receiving tubes at present is for replacement use in television receivers and as original equipment in new television sets.

U.S. Tariff Treatment

Electronic receiving tubes and mounts, the articles produced by the petitioning workers at the Tell City, Ind., plant of General Electric Co., are classified under item 687.60 of the TSUS, which also provides for transistors, certain other electronic tubes, semiconductors, and related parts. Under the original schedules of the Tariff Act of 1930, these articles were classifiable in a group of electrical articles under paragraph 353 at the rate of 35 percent ad valorem.

Television receivers, the end product for most receiving tubes, as well as diodes, transistors, and integrated circuits, were also classifiable under paragraph 353 of the Tariff Act of 1930, but now are classified under 685.20 of the TSUS. The 35-percent rate remained unchanged from June 18, 1930, through December 31, 1938.

Pursuant to successive trade-agreement concessions beginning in 1939, the applicable rates of duty have been substantially reduced. The rates of duty currently (1974) in effect on these articles range from 5 percent ad valorem to 6 percent, reflecting the final stage, effective January 1, 1972, of the five-stage concessions granted in the Kennedy Round negotiations under the General Agreement on Tariffs and Trade (GATT).

The effective dates of the various rates of duty applicable to the aforementioned articles under the Tariff Act of 1930, as modified by trade-agreement concessions and the Tariff Classification Act of 1962, are given in the following table.

Certain electronic components and television receivers: U.S.
rates of duty, 1930-72

(In percent ad valorem)

Effective date	Authority	Receiving tubes, transistors, diodes, and integrated circuits (TSUS item 687.60)	Television receivers (TSUS item 685.20)
June 18, 1930	Tariff Act of 1930	35.0	35.0
Jan. 1, 1939	Trade agreement with the United Kingdom.	25.0	25.0
Jan. 1, 1948	GATT concession	15.0	15.0
Jan. 6, 1951	do	12.5	12.5
June 30, 1956	do	12.5	11.5
June 30, 1957	do	12.5	11.0
June 30, 1958	do	12.5	10.5
July 1, 1962	do	12.5	10.0
Aug. 31, 1963	1/	12.5	10.0
Jan. 1, 1968	GATT concession	11.0	9.0
Jan. 1, 1969	do	10.0	8.0
Jan. 1, 1970	do	8.5	7.0
Jan. 1, 1972 2/-	do	7.0	6.0
Jan. 1, 1972	do	6.0	5.0

1/ Tariff Classification Act of 1962.

2/ An additional 10-percent import duty was imposed from Aug. 16, 1971, to Dec. 19, 1971 (Presidential Proclamations 4074 and 4098). On July 8, 1974, the United States Customs Court held that Presidential Proclamation 4074 was invalid (Yoshida International, Inc. vs. United States, Customs Decisions 4550). This ruling has been appealed to the United States Court of Customs and Patent Appeals.

In addition, the TSUS under items 806.30 and 807.00 provides partial exemption from the above duties. Pursuant to the provisions of item 806.30, articles of metal (except precious metal) that have been manufactured, or subjected to a process of manufacture, in the United States and exported for processing and returned to the United States for further processing are subject to duty only on the value of the foreign processing. Under tariff item 807.00, imported articles assembled in foreign countries with fabricated components

that in whole or in part have been manufactured in the United States are subject to duty on the full value of the imported article less the value of U.S. fabricated components contained therein. No further processing in the United States is required for articles imported under item 807.00. These duty exemptions on the U.S. materials contained in the imported articles are not subject to trade agreement concessions.

U.S. Producers

Three producers of electronic receiving tubes in the United States account for nearly all of the domestic production--General Electric Co., RCA Corp., and GTE Sylvania. These firms obtain the electronic receiving tube mounts used in manufacturing tubes from their own plants in the United States and from their foreign affiliates in Brazil, Mexico, and Singapore. * * * also supplies parts to two domestic service organizations to assemble mounts.

U.S. Consumption, Shipments, and Imports

Electronic receiving tube mounts 1/

* * * * *

^{1/} The data in this section are based on information obtained by the Tariff Commission from the three largest domestic manufacturers of electronic receiving tubes. These firms are believed to have accounted for more than 95 percent of U.S. production of electronic receiving tubes, and consequently, of the consumption, shipment, and imports of tube mounts.

A-7 through A-10

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Electronic receiving tubes

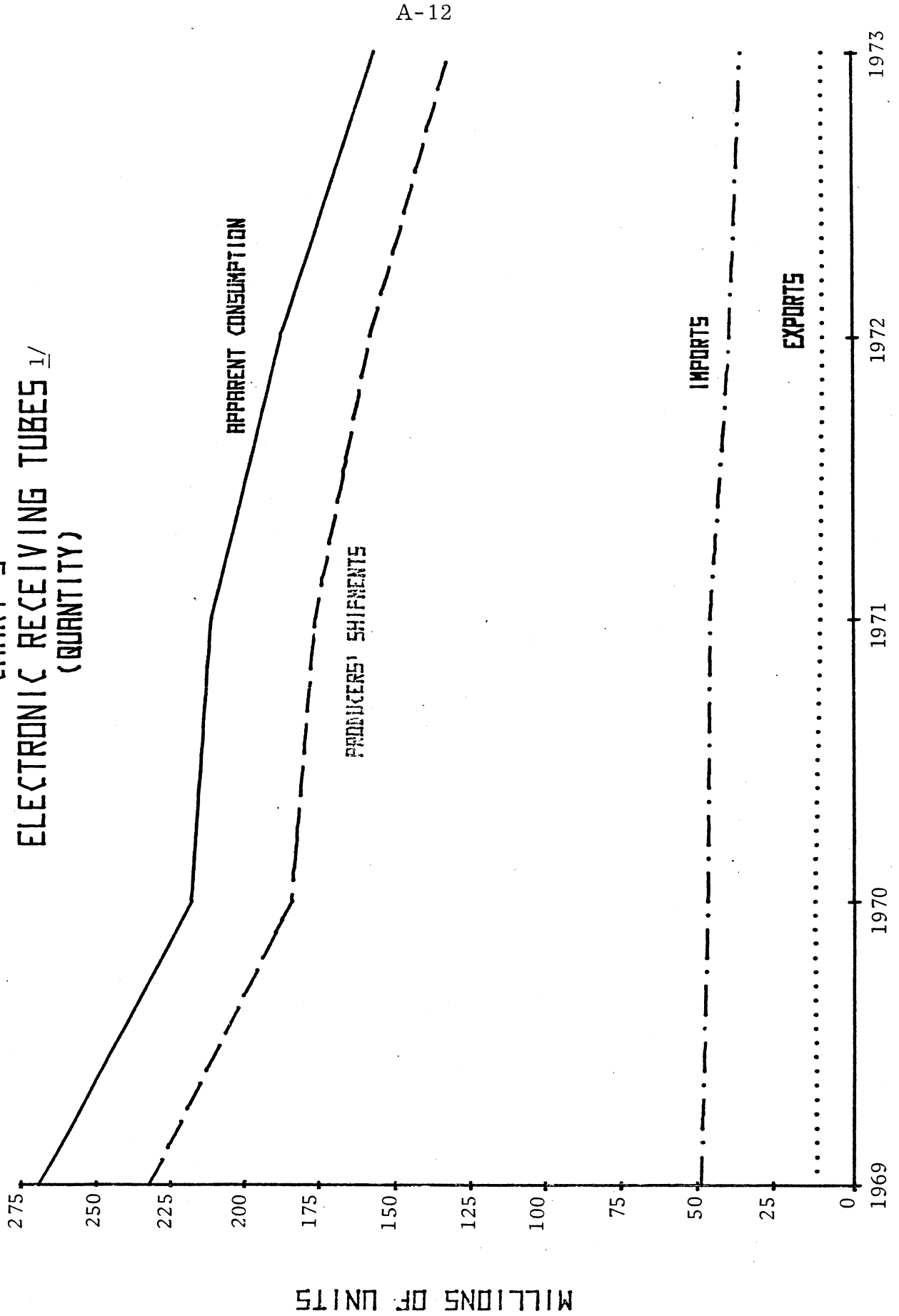
Consumption of receiving tubes has declined steadily in recent years as semiconductors have been utilized increasingly in consumer electronic products. The expanding use of improved semiconductors in these products has limited, in large part, the use of receiving tubes to television receivers and the replacement market.

Apparent U.S. consumption of receiving tubes declined steadily from 269.0 million units, valued at \$230.2 million, in 1969 to 158.9 million units, valued at \$158.5 million, in 1973 as shown in charts 3 and 4 on pages A-12 and A-13 (and in table 2). For the first half of 1974, tube consumption amounted to 61.4 million units, valued at \$53.2 million, compared with 81.6 million units, valued at \$79.6 million, for the corresponding period in 1973.

Shipments of receiving tubes by U.S. producers generally followed the same trend as U.S. consumption of such tubes, declining steadily throughout recent years. Annual shipments declined from 232.2 million units, valued at \$225.0 million, in 1969 to 133.4 million units, valued at \$152.1 million, in 1973. These shipments amounted to 54.1 million units, valued at \$53.3 million, in the first half of 1974, compared with 66.0 million units, valued at \$75.2 million, for the corresponding period in 1973.

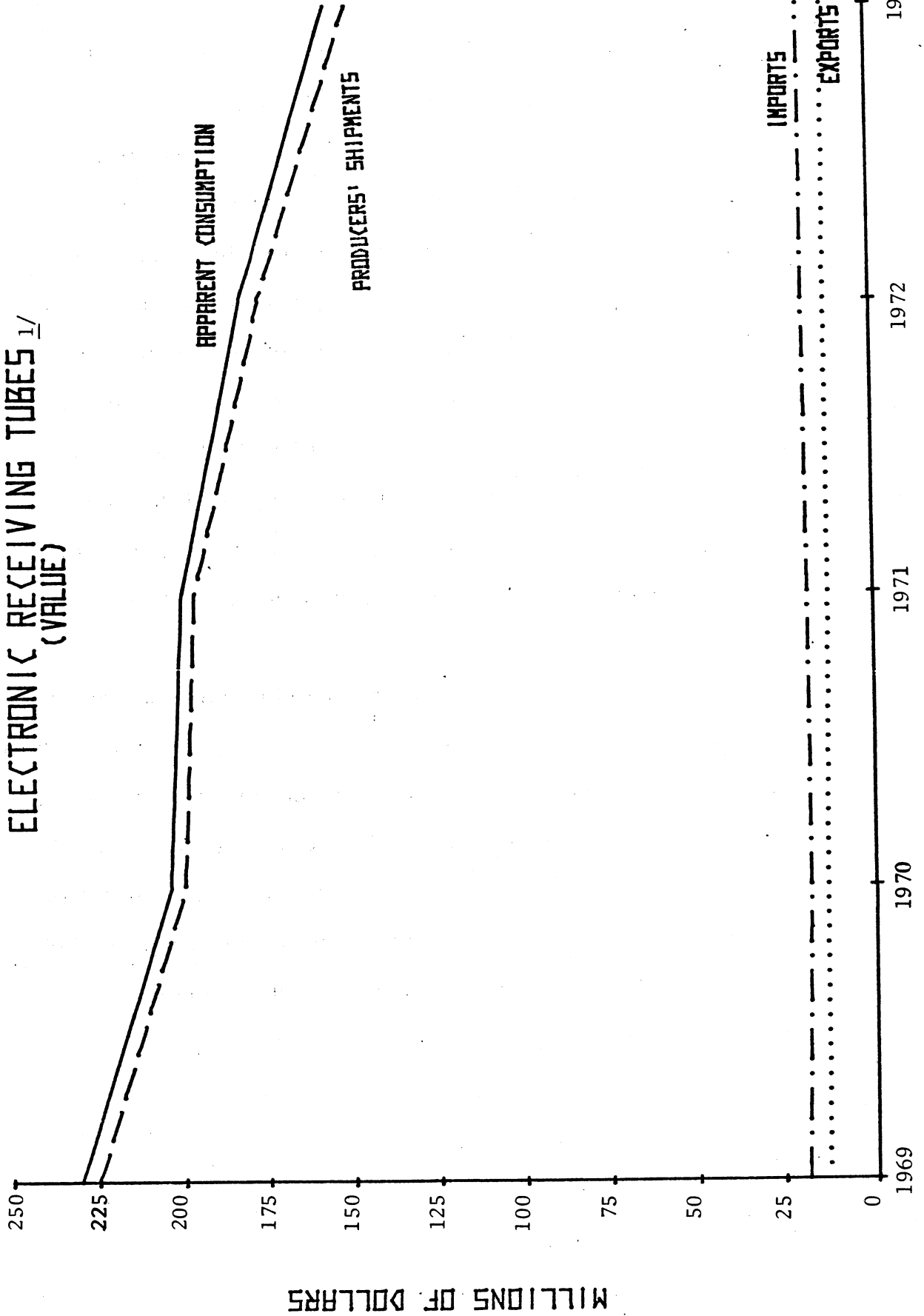
The quantity of U.S. imports of receiving tubes declined steadily from 48.7 million units in 1969 to 35.4 million units in 1973. However, the value of the imports, after declining from \$18.4 million in 1969 to \$17.6 million in 1970, increased steadily to \$18.8 million in 1973. For the first half of 1974, imports amounted to 13.1 million

CHART 3
ELECTRONIC RECEIVING TUBES ^{1/}
(QUANTITY)



^{1/} U.S. Producers' shipments, imports, exports, and apparent consumption, 1969-73.

CHART 4
ELECTRONIC RECEIVING TUBES ^{1/}
(VALUE)



^{1/} U.S. producers' shipments, imports, exports, and apparent consumption, 1969-73.

units, valued at \$7.0 million, compared with 20.8 million units, valued at \$10.5 million, in the like period of 1973. In terms of quantity, the share of annual domestic consumption of receiving tubes supplied by imports steadily increased from 18.1 percent in 1969 to 22.3 percent in 1973 except for a slight decline in 1972; the share accounted for by imports in the first half of 1974 amounted to 21.3 percent, compared with 25.5 percent for the corresponding period in 1973. In terms of value, the share of imports to consumption has risen each year, from 8.0 percent in 1969 to 13.2 percent in the first half of 1974. Table 3 shows the U.S. rates of duty and the value of U.S. imports of electronic receiving tubes and receiving tube mounts during 1964-73; data on imports for earlier years are not available.

In addition to imports of electronic receiving tubes per se, substantial quantities are imported as parts of imported television receivers, the principal consumer electronic products in which receiving tubes have been used in recent years. The following table, based partly on estimates, shows that imports of tubes as components of imported television receivers increased from 53.9 million in 1969 to 62.4 million in 1972 and then declined to 46.9 million in 1973.

Total number of electronic receiving tubes contained in television receivers imported into the United States, based on average tube complement, and U.S. imports of television receivers, 1969-73

Year	Imports		Average tube complement 1/		Total number of tubes contained in imported television receivers 1/
	Color receivers	Black and white receivers	Color receivers	Black and white receivers	
	<u>1,000 units</u>	<u>1,000 units</u>	<u>Units per set</u>	<u>Units per set</u>	<u>Million units</u>
1969-----	912	3,121	18	12	53.9
1970-----	914	3,596	16	11	54.2
1971-----	1,281	4,166	12	11	61.2
1972-----	1,318	5,056	9	10	62.4
1973-----	1,399	4,987	5	8	46.9

1/ Estimated.

Source: Compiled from data provided by a domestic producer in combination with official statistics of the U.S. Department of Commerce.

As indicated in the following table, imports of receiving tubes entered under TSUS item 807.00 (primarily units assembled by subsidiaries of U.S. firms in Taiwan) increased in 1972 from the previous year's level and then declined substantially in 1973. There were no imports reported under this classification in 1969 and 1970. Imports entered under item 807.00 (based on value) accounted for a very small portion of total imports in 1973. The share of the total value of the imports under item 807.00 accounted for by U.S. components increased from 16 percent in 1971 to 31 percent in 1973. However, this share is expected to decline in the future as U.S. - and foreign-owned firms increase production of parts for electronic receiving tubes in the Far East.

Electronic receiving tubes: U.S. imports entered
under item 807.00, 1969-73 1/

Item	1971	1972	1973
Quantity-----units--	40,000	761,855	41,853
Total value-----dollars--	9,281	219,586	32,888
Value of U.S. components, duty exempt dollars--	1,486	45,114	10,215
Foreign value added-----do----	7,795	174,472	22,673
Ratio of value of U.S. components to total value of imports-----percent--	16.0	20.5	31.1

1/ There were no imports under item 807.00 in 1969 and 1970.

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

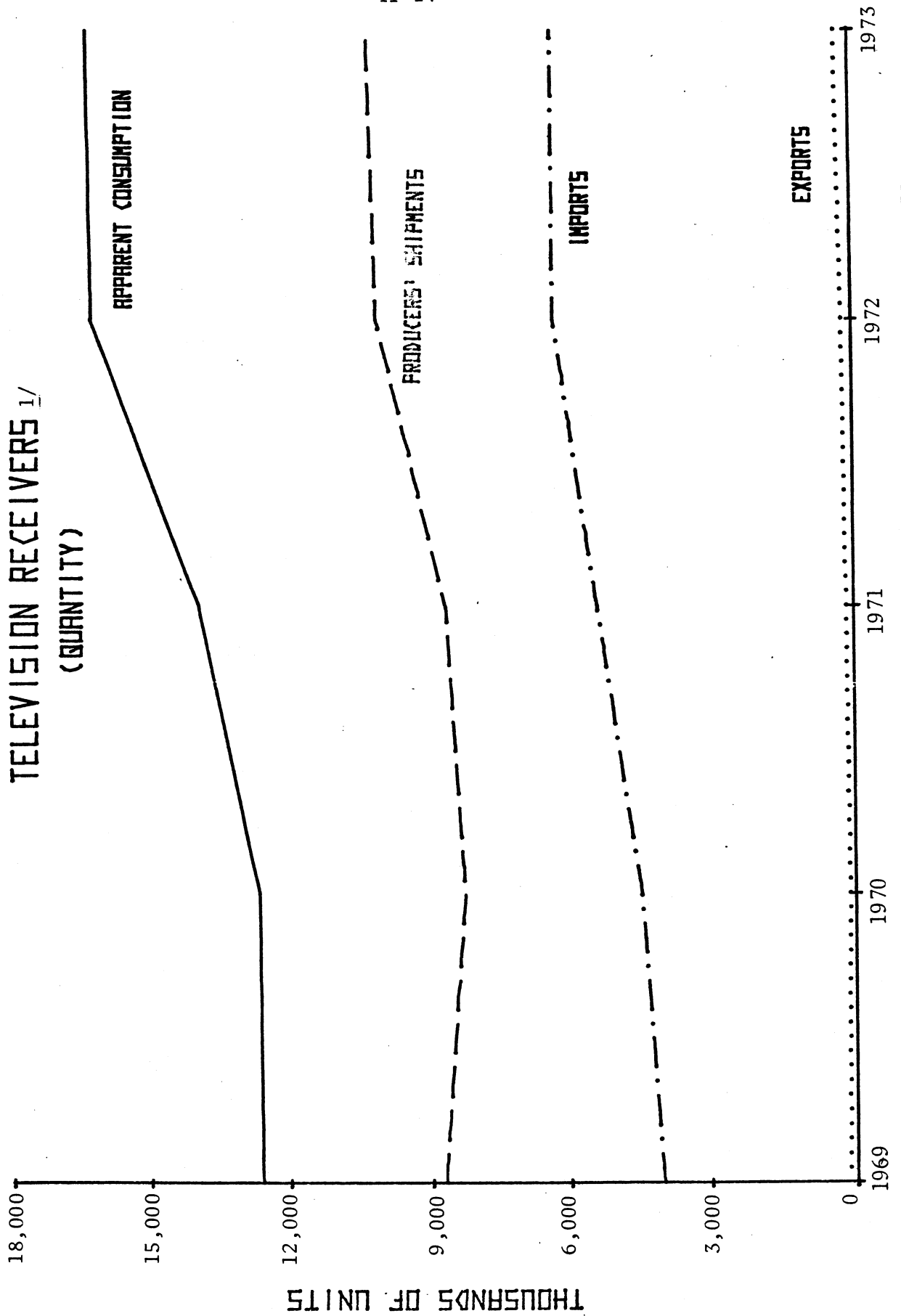
Television receivers

Apparent U.S. consumption of television receivers (monochrome and color) increased from 12.6 million units, valued at \$2.1 billion, in 1969 to 16.5 million units, valued at \$2.7 billion, in 1973 as shown in charts 5 and 6 on pages A-17 and A-18 (and in table 4). The quantity of imports expressed as a percent of consumption increased from 32 percent in 1969 to 39 percent in 1971 and has since remained at that level. The value of imports expressed as a percent of consumption generally followed the same trend, increasing from 14 percent in 1969 to 19 percent in 1972 and 1973.

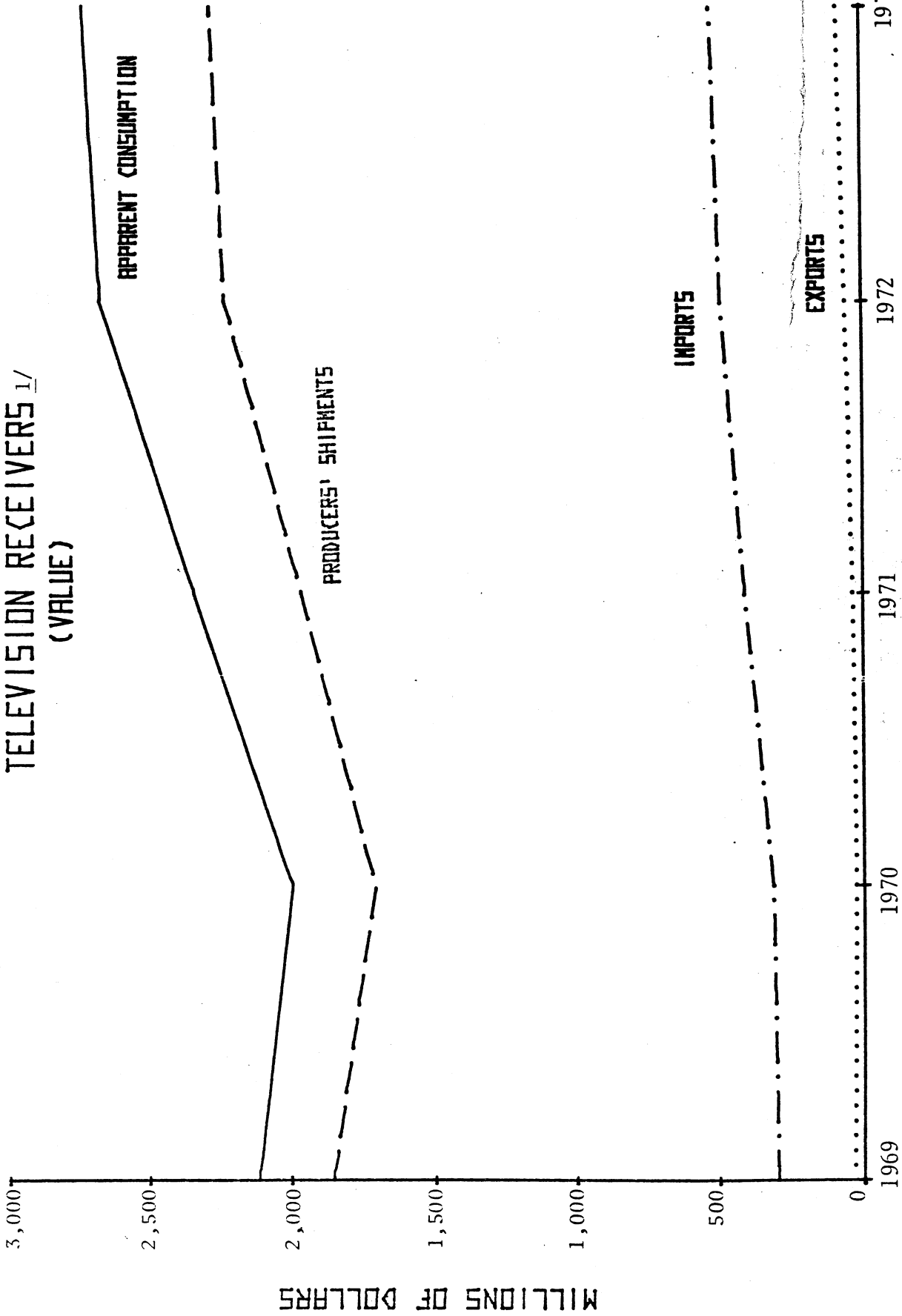
U.S. producers' shipments of domestically produced television receivers (monochrome and color) declined slightly from 8.7 million units, valued at \$1.9 billion, in 1969 to 8.3 million units, valued at \$1.7 billion, in 1970 and then increased annually to an estimated 10.4 million units, valued at \$2.3 billion, in 1973.

CHART 5
TELEVISION RECEIVERS 1/
(QUANTITY)

A-17



(HHKI b)
TELEVISION RECEIVERS ^{1/}
(VALUE)



^{1/} U.S. producers' shipments, imports, exports, and apparent consumption, 1969-73.

During 1969-73, annual U.S. imports of television receivers (monochrome and color) increased each year--rising from 4.0 million units, valued at \$296 million, in 1969 to 6.4 million units, valued at \$531 million, in 1973--representing a gain of 58 percent in terms of quantity and of 79 percent in terms of value (table 4). The rates of duty and the value of imports of television receivers during 1964-73 are shown in table 5; data on imports in earlier years are not available.

Imports of television receivers entered under tariff item 807.00 (primarily units assembled by foreign subsidiaries of U.S. firms in Taiwan and Mexico) increased during 1969-73 both in absolute amounts (see following table) and in relation to total imports. Based on value, imports entered under item 807.00 accounted for 26 percent of total imports in 1973, compared with 16 percent in 1969; based on quantity, such imports accounted for 23 percent and 42 percent of the total, respectively, in those years.

Television receivers: U.S. imports entered
under item 807.00, 1969-73

Item	1969	1970	1971	1972	1973
Quantity-----1,000 units--	940	1,197	1,423	2,765	2,703
Total value-----million dollars--	47.0	56.1	71.9	144.5	139.3
Value of U.S. components, duty exempt-----do----	17.7	19.7	22.4	30.5	25.0
Foreign value added, dutiable-----do----	29.3	36.4	49.5	114.0	114.3

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

Semiconductors

There are three major types of semiconductors--transistors, diodes, and integrated circuits. None of these devices contain mounts of the type covered in this investigation. Substitution of semiconductors for tubes has become increasingly important owing to the introduction of new products utilizing these components and to technological improvements in existing products. In recent years, integrated circuits have been used widely in place of transistors, diodes, and electronic receiving tubes. Thousands of transistors and diodes, as well as large quantities of passive components, such as resistors, capacitors, and inductors, may be displaced by a single integrated circuit array.

U.S. consumption of semiconductors increased by 38 percent in quantity during 1969-72. Consumption probably continued to rise in 1973 (data on producers' shipment in 1973 are not available). Apparent consumption of semiconductors declined from 4.3 billion units, valued at \$1.0 billion, in 1969 to about 3.9 billion units, valued at \$1.1 billion, in both 1970 and 1971, and then rose markedly to 5.9 billion units, valued at \$1.4 billion, in 1972 as shown in charts 7 and 8 on pages A-22 and A-23 (and in table 6). The growth, both absolute and relative, in the importance of integrated circuits is shown in the following table.

Percentage distribution of apparent U.S. consumption of
semiconductors, by types, 1969-72 ^{1/}

Type	1969	1970	1971	1972
	Percent of total quantity			
Integrated circuits-----	2/	13	17	20
Transistors-----	38	36	36	42
Diodes-----	2/	51	47	38
Total-----	100	100	100	100
	Percent of total value			
Integrated circuits-----	2/	42	50	61
Transistors-----	42	38	34	28
Diodes-----	2/	20	16	11
Total-----	100	100	100	100

^{1/} Data on U.S. shipments in 1973 are not available.

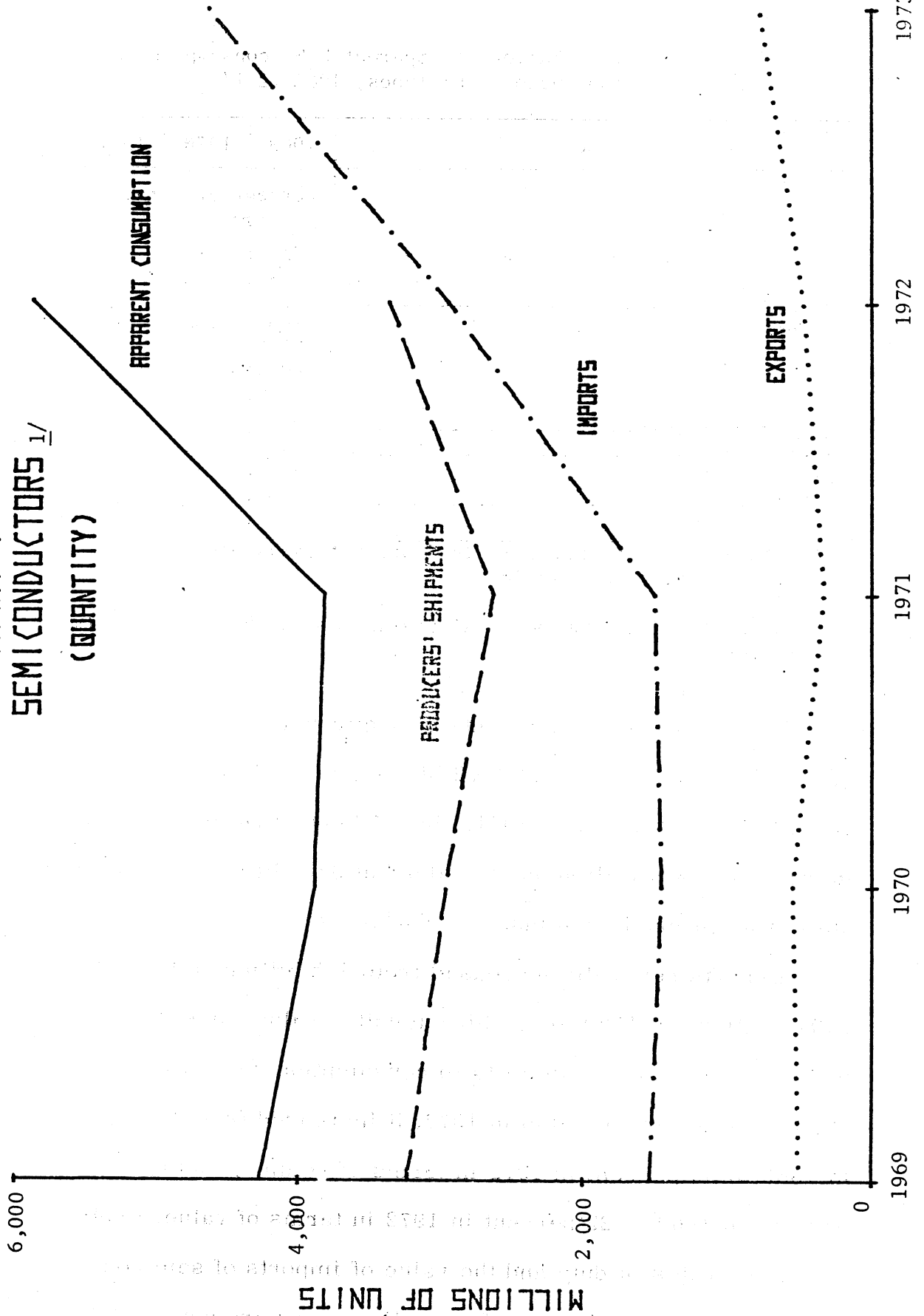
^{2/} Not separately available.

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

U.S. producers' shipments of semiconductors decreased from 3.2 billion units, valued at \$1.2 billion, in 1969 to 2.7 billion units, valued at \$1.1 billion, in 1971. In 1972 both quantity and value increased to 3.4 billion units, valued at \$1.3 billion. Producers' shipments probably continued to rise in 1973.

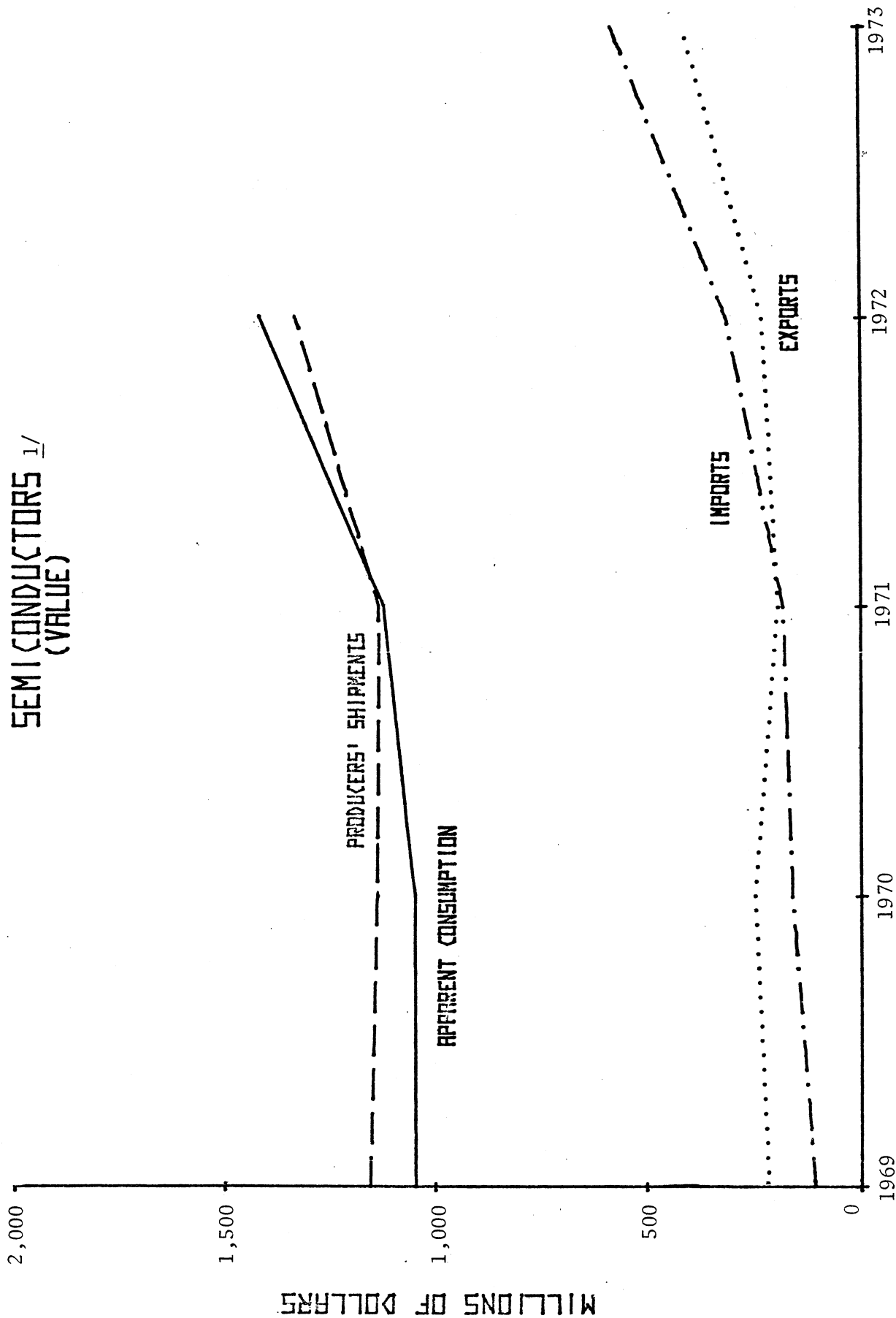
Imports generally increased from 1.5 billion units, valued at \$104 million, in 1969 to 4.7 billion units, valued at \$586 million, in 1973. The ratio of imports to consumption rose steadily during 1969-72 and probably also in 1973; it increased from 36 percent in 1969 to 50 percent in 1972 in terms of volume, and from 10 percent in 1969 to 22 percent in 1972 in terms of value. Table 7 shows the rates of duty and the value of imports of semiconductors in 1964-73; data on imports for earlier years are not available.

CHART 7 SEMI CONDUCTORS ^{1/} (QUANTITY)



^{1/} U.S. producers' shipments, imports, exports, and apparent consumption, 1969-73.

CHART B
SEMI CONDUCTORS ^{1/}
(VALUE)



^{1/} U.S. producers' shipments, imports, exports, and apparent consumption, 1969-73.

The great bulk of U.S. imports of semiconductors in recent years has been classified under TSUS items 806.30 and 807.00 and was entered by a few U.S. firms, principally * * *, * * *, and * * *. As shown in table 8, these imports accounted for 89 percent, in terms of quantity, and 84 percent, in terms of value, of total imports of semiconductors in 1969. These shares have declined to 73 percent and 70 percent, respectively, of total imports of semiconductors in 1973. However, such imports increased irregularly from 1.4 billion units, valued at \$87 million, in 1969 to 3.5 billion units, valued at \$408 million, in 1973 (table 9).

Statistics on shipments, imports, exports, and consumption of transistors, diodes, and integrated circuits are shown in tables 10, 11, and 12, respectively.

General Electric Co.

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A-25 through A-36

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STATISTICAL APPENDIX

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Table 2.--Electronic receiving tubes: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1969-73, January-June 1973, and January-June 1974.

(Quantity in millions of units; value in millions of dollars)

Period	Producers' shipments ^{1/}	Imports ^{2/}	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1969-----	232.2	48.7	11.9	269.0	18.1
1970-----	184.7	46.7	12.7	218.7	21.4
1971-----	177.4	46.0	10.7	212.7	21.6
1972-----	159.9	39.4	9.8	189.5	20.8
1973-----	133.4	35.4	9.9	158.9	22.3
January-June--					
1973-----	66.0	20.8	5.2	81.6	25.5
1974-----	54.1	13.1	5.8	61.4	21.3
Value					
1969-----	225.0	18.4	13.2	230.2	8.0
1970-----	200.2	17.6	13.3	204.5	8.6
1971-----	197.4	18.0	12.7	201.2	8.9
1972-----	178.4	18.7	12.9	184.2	10.2
1973-----	^{3/} 152.1	18.8	12.4	158.5	11.9
January-June--					
1973-----	^{3/} 75.2	10.5	6.1	79.6	13.2
1974-----	^{3/} 53.3	7.0	7.1	53.2	13.2

^{1/} Compiled from sales data supplied by the Electronic Industries Association and average prices derived from U.S. Department of Commerce estimates.

^{2/} Total imports adjusted by U.S. Tariff Commission to delete imports of mounts entered under TSUSA item 687.6010 (estimated). See Customs Information Exchange (C.I.E.) N-95/73 dated Mar. 6, 1973.

^{3/} Estimated by the U.S. Tariff Commission.

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

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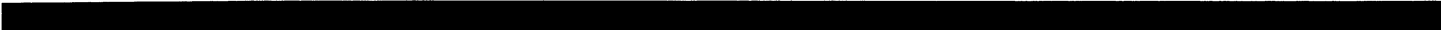


Table 4.--Television receivers: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1969-73

(Quantity in thousands of units; value in millions of dollars)

Year	Producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1969-----	8,721	4,033	157	12,597	32
1970-----	8,308	4,510	126	12,692	36
1971-----	8,740	5,447	162	14,025	39
1972-----	10,219	6,375	224	16,370	39
1973-----	<u>1/</u> 10,400	6,387	314	16,473	39
Value					
1969-----	1,852	296	33	2,115	14
1970-----	1,714	315	26	2,003	16
1971-----	1,976	413	37	2,352	18
1972-----	2,248	497	59	2,686	19
1973-----	<u>1/</u> 2,300	531	84	2,747	19

1/ Estimated by the U.S. Tariff Commission.

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

Table 5.--Television receivers: U.S. rates of duty and imports for consumption, by types, 1964-73

Year	Rate of duty	Imports		
		Monochrome	Color	Total
	Percent ad valorem	Million dollars	Million dollars	Million dollars
1964-----	10	1/	1/	39
1965-----	10	1/	1/	60
1966-----	10	1/	1/	115
1967-----	10	1/	1/	124
1968-----	9	97	106	204
1969-----	8	152	143	296
1970-----	7	174	142	316
1971-----	6	208	205	413
1972-----	5	262	235	497
1973-----	5	269	262	531

1/ U.S. imports of monochrome and color television receivers were not separately reported in official statistics prior to 1967.

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

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

Table 6.--Semiconductors: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1969-73

(Quantity in millions of units; value in millions of dollars)

Year	Producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1969-----	3,233.3	1,534.4	497.1	4,270.6	35.9
1970-----	2,977.9	1,464.8	544.7	3,898.0	37.6
1971-----	2,655.7	1,516.3	331.3	3,840.7	39.5
1972-----	^{1/} 3,393.7	2,979.4	468.6	5,904.6	50.5
1973-----	_{2/}	4,713.7	779.6	_{2/}	_{2/}
Value					
1969-----	1,154.0	104.3	211.0	1,047.3	10.0
1970-----	1,141.1	157.2	246.0	1,052.3	14.9
1971-----	1,140.7	179.1	191.2	1,128.6	15.9
1972-----	1,342.4	316.4	229.6	1,427.3	22.2
1973-----	_{2/}	585.9	417.2	_{2/}	_{2/}

^{1/} Estimated by the U.S. Tariff Commission.

_{2/} Not available.

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

Table 7.--Semiconductors: U.S. rates of duty and imports
for consumption, by types, 1964-73

Year	Rate of duty	Imports			
		Transistors	Diodes	Integrated circuits	Total
	Percent ad valorem	Million dollars	Million dollars	Million dollars	Million dollars
1964-----	12.5	5.6	1/	1/	8.4
1965-----	12.5	15.1	1/	1/	24.3
1966-----	12.5	28.7	1/	1/	42.2
1967-----	12.5	26.7	1/	1/	43.4
1968-----	11.0	44.7	1/	1/	71.5
1969-----	10.0	59.0	1/	1/	104.3
1970-----	8.5	59.8	27.9	69.4	157.2
1971-----	7.0	60.4	24.5	94.2	179.1
1972-----	6.0	100.1	35.9	180.5	316.4
1973-----	6.0	159.8	69.2	356.9	585.9

1/ Not separately available.

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

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

Table 8.--Semiconductors: Share of total U.S. imports represented by imports under TSUS items 806.30 and 807.00, by types, 1969-73

Type	1969	1970	1971	1972	1973
Percent of total quantity					
Integrated circuits-----	<u>1/2/</u> 86	97	85	80	64
Transistors-----	92	91	86	87	75
Diodes-----	<u>2/</u> :)	:	:	(81	81
Rectifiers-----	<u>2/</u> :)	<u>3/</u> 86	<u>3/</u> 82	(88	72
Other-----	<u>2/</u> :)	:	:	(81	68
Average-----	89	90	84	84	73
Percent of total value					
Integrated circuits-----	<u>1/2/</u> 81	95	87	79	70
Transistors-----	86	89	87	82	73
Diodes-----	<u>2/</u> :)	:	:	(61	57
Rectifiers-----	<u>2/</u> :)	<u>3/</u> 72	<u>3/</u> 69	(88	77
Other-----	<u>2/</u> :)	:	:	(66	56
Average-----	84	88	85	79	70

1/ Data do not include integrated circuits imported under TSUS item 806.30.

2/ Data on diodes, rectifiers, and other semiconductors are included with those on integrated circuits.

3/ Data on diodes, rectifiers, and other semiconductors are aggregated.

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

Table 9.--Semiconductors: Total U.S. imports under TSUS items 806.30 and 807.00, by types, 1969-73

Type	1969	1970	1971	1972	1973
Quantity (million units)					
Integrated circuits-----	1/2/ 718.2	240.5	275.0	538.6	697.2
Transistors-----	646.3	548.1	481.7	1,222.6	1,529.1
Diodes-----	2/ :)			(577.1	970.8
Rectifiers-----	2/ :)	3/ 529.9	3/ 517.7	(72.2	164.6
Other-----	2/ :)			(86.9	102.0
Total-----	1,364.5	1,318.5	1,274.5	2,497.5	3,463.7
Value (million dollars)					
Integrated circuits-----	1/2/ 36.6	65.8	82.6	143.0	249.3
Transistors-----	50.7	53.1	52.8	81.8	116.1
Diodes-----	2/ :)			(12.6	23.0
Rectifiers-----	2/ :)	3/ 20.2	3/ 16.8	(7.5	11.0
Other-----	2/ :)			(4.4	8.2
Total-----	87.3	139.1	152.2	249.4	407.6

1/ Data do not include integrated circuits imported under TSUS item 806.30. In 1969 the value was about \$20.3 million.

2/ Data on diodes, rectifiers, and other semiconductors are included with those on integrated circuits.

3/ Data on diodes, rectifiers, and other semiconductors are aggregated.

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

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

Table 10.--Transistors: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1969-73

(Quantity in millions of units; value in millions of dollars)

Year	Producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1969-----	1,192.3	701.4	280.2	1,613.5	43.5
1970-----	1,064.4	602.3	249.5	1,417.2	42.5
1971-----	969.2	559.7	139.6	1,389.3	40.3
1972-----	1,259.0	1,408.3	212.3	2,455.0	57.4
1973-----	<u>1/</u>	2,038.3	351.2	<u>1/</u>	<u>1/</u>
Value					
1969-----	460.5	59.0	83.1	436.4	13.5
1970-----	435.8	59.8	88.9	406.7	14.7
1971-----	372.0	60.4	50.3	382.1	15.8
1972-----	406.1	100.1	61.3	444.9	22.5
1973-----	<u>1/</u>	159.8	94.6	<u>1/</u>	<u>1/</u>

1/ Not available.

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

Table 11.--Diodes: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1969-73

(Quantity in millions of units; value in millions of dollars)

Year	Producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1969-----	1,762.4	<u>1/</u>	162.0	<u>1/</u>	<u>1/</u>
1970-----	1,621.8	613.8	229.2	2,006.4	30.6
1971-----	1,299.0	633.1	137.5	1,794.6	35.3
1972-----	1,529.7	901.2	163.8	2,267.1	39.8
1973-----	<u>1/</u>	1,579.1	254.0	<u>1/</u>	<u>1/</u>
Value					
1969-----	234.8	<u>1/</u>	55.5	<u>1/</u>	<u>1/</u>
1970-----	240.7	27.9	57.3	211.3	13.2
1971-----	200.8	24.5	49.6	175.7	13.9
1972-----	237.0	35.9	64.7	208.2	12.7
1973-----	<u>1/</u>	69.2	104.9	<u>1/</u>	<u>1/</u>

1/ Not available.

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

Table 12.--Integrated circuits: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1970-73

(Quantity in thousands of units; value in thousands of dollars)

Year	Producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1970-----	291,701	248,710	66,004	474,407	52.4
1971-----	387,495	323,458	54,211	656,742	49.3
1972-----	<u>1/</u> 605,000	669,974	92,483	1,182,491	56.7
1973-----	<u>2/</u>	1,096,354	174,389	<u>2/</u>	<u>2/</u>
Value					
1970-----	464,607	69,444	99,768	434,283	16.0
1971-----	567,925	94,248	91,243	570,930	16.5
1972-----	699,296	180,459	105,541	774,214	23.3
1973-----	<u>2/</u>	356,851	217,723	<u>2/</u>	<u>2/</u>

1/ Estimated by the U.S. Tariff Commission.

2/ Not available.

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

Note.--Data for integrated circuits are not differentiated from other semiconductors in 1969 and, thus, are not available.

A-50 through A-59

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