UNITED STATES TARIFF COMMISSION

TRANSISTORS AND DIODES: WORKERS OF THE BUFFALO, N.Y., PLANT OF GENERAL ELECTRIC CO.

Report to the President
on Investigation No. TEA-W-196
Under Section 301(c)(2) of the Trade Expansion Act of 1962

TC Publication 588
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UNITED STATES TARIFF COMMISSION

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Note.- The whole of the Commission's report to the President may not be made public since it contains certain information that could result in the disclosure of the operations of an individual concern. This published report is the same as the report to the President, except that the above-mentioned information has been omitted. Such omissions are indicated by asterisks.

REPORT TO THE PRESIDENT

U.S. Tariff Commission,
June 22, 1973.

To the President:

In accordance with section 301(f)(1) of the Trade Expansion Act of 1962 (TEA) (76 Stat. 885), the U.S. Tariff Commission herein reports the results of an investigation made under section 301(c)(2) of the act in response to a petition filed by a group of workers.

On April 24, 1973, the Tariff Commission received a petition from a group of workers filed on behalf of the former workers of the Buffalo, N.Y., plant of General Electric Co., New York, N.Y., for a determination of eligibility to apply for adjustment assistance. The Commission instituted the investigation (TEA-W-196) on April 26, 1973, to determine whether, as a result in major part of concessions granted under trade agreements, articles like or directly competitive with transistors and diodes (of the type provided for in item 687.60 of the Tariff Schedules of the United States) produced by said firm 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.

Public notice of the investigation was given by posting copies of the notice at the office of the Commission in Washington, D.C., at the New York City office, and by publication in the Federal Register of May 1, 1973 (38 F.R. 10775). No public hearing was requested, and none was held.

(1) An article like or directly competitive with an article produced by the workers concerned must be imported in increased quantities;

(2) The increased imports must be a result in major part of concessions granted under trade agreements;

(3) A significant number or proportion of the workers concerned must be unemployed or underemployed or threatened with unemployment or underemployment; and

(4) The increased imports resulting in major part from trade-agreement concessions must be the major factor in causing or threatening to cause the unemployment or underemployment.

Increased imports

It is abundantly clear that imports of articles like those made at the Buffalo, N.Y., plant of the General Electric Co. have increased. Total U.S. imports of semiconductors in 1972 amounted to 3 trillion units or about double the level of imports reached in 1969, 1970, and 1971, and triple the level of imports of such articles in 1968. In 1972, imports of semiconductors accounted for nearly 50 percent of apparent U.S. consumption of such articles. Imports of semiconductors by the General Electric Co. in 1972 amounted to * * *.

With the closing of the plant there will be no shipments in 1973. * * *.

In addition to the * * * above, imports of a number of products that contain semiconductors of the type produced at Buffalo have increased in recent years, thereby limiting the growth in domestic market demand for semiconductors of the type produced at Buffalo. Imports of television receivers increased from 2.7 million units in 1968 to 6.4 million units or nearly 40 percent of apparent U.S. consumption in 1972. Imports of home-type radio receivers also increased during the period. In 1968, they amounted to 28 million units, and in 1972, they amounted to 42 million units or 96 percent of apparent U.S. consumption. In addition, imports of audio home magnetic tape recorders and players increased from 4.9 million units in 1968 to 7 million units (95 percent of apparent U.S. consumption) in 1971. Imports of finished end products which incorporate semiconductors obviously have their effect on U.S. production and demand for semiconductors.

It is evident from the foregoing that imports of semiconductors of the type formerly produced at the Buffalo plant of the General Electric Co. have increased.

In major part

The requirement that increased imports be due in major part to tariff concessions granted under trade agreements is also met. As has been held in previous cases, this requirement is satisfied if, except for trade-agreement concessions, imports would not be at substantially their present levels. Since 1930, the rate of duty applicable to semiconductors has been reduced progressively from 35 percent ad valorem in 1930 to 6 percent ad valorem in 1972. The rate of duty applicable to semiconductors was 12.5 percent ad valorem in 1967 just prior to the first stage of Kennedy Round tariff reductions. As a result of concessions granted by the United States in the Kennedy Round, the U.S. rate of duty applicable to semiconductors was reduced by more than 50 percent by 1972. Many electronic articles are imported with a duty exemption under TSUS items 806.30 and 807.00, which affords an exemption on the value of the U.S. components returned to the United States in imported merchandise. In 1972, the value of U.S. goods returned as parts of semiconductors * * * amounted to * * *. Therefore, the duty reductions resulting from trade agreements were applicable to * * * imports in that year.

During the course of its investigation, the Commission obtained information from U.S. producers and importers of semiconductors, including the General Electric Co., on the wholesale cost of U.S.-produced semiconductors as compared with the landed, duty paid, wholesale costs of the identical imported articles. The investigation indicated that competition was strong and the differences in price from one manufacturer to another were small. * * * the comparisons show that the reduction in duty from 35 percent in 1930 to 7 percent in 1971, accounted for more than the difference between the cost of the imported product and the cost of the domestic article. The 50-percent reduction in duty resulting from the Kennedy Round obviously served as an incentive to * * * U.S. manufacturers to turn to imports or to establish production facilities in foreign countries. Consequently, we are satisfied that imports would not be at substantially their present level, and General Electric would not have set up production of semiconductors abroad, save for the trade-agreement concessions. The second requirement has been met.

Unemployment

The third criterion for an affirmative determination--that the workers producing the like or directly competitive article must be unemployed or underemployed--has been unmistakenly satisfied.

All of the workers at the Buffalo plant of General Electric were involved in the production of semiconductors and related electronics articles that are being imported in increasing quantities * * *

* * *. Employment at the Buffalo plant declined from * * * workers who accounted for * * * million man-hours in 1969 to * * * workers accounting for * * * man-hours in 1972. * * *. The plant closed down in December 1972. By January 1, 1973, there were no employees left at the plant.

Major factor

The previous requirements all having been met, the final requirement is that the imports resulting in major part from tariff concessions must be the major factor in causing or threatening to cause the unemployment or underemployment. This requirement is satisfied if, in the absence of increased imports of the articles concerned, the unemployment would not have occurred.

There is no doubt that the increased imports of semiconductors * * * from * * * foreign sources, are the major factor in causing the unemployment at General Electric's Buffalo, N.Y., plant. The imports of semiconductors increased in such quantities as a result in major part of concessions granted under trade agreements * * *.

The trade-agreement concessions and the advantages thereby afforded to foreign production * * * . This is further evidenced by the closing of the Buffalo plant at a time when demand for semiconductors in the United States was increasing and when such articles were in short supply. The Buffalo, N.Y., plant closed and its workers became unemployed as a result * * *. It is clear therefore that increased imports in major part the result of trade-agreement concessions were the major factor in the closing of the Buffalo, N.Y., plant. The fourth criterion is met.

Conclusion

Since the requirements of the act have all been met, we have made an affirmative determination.

Views of Commissioners Leonard and Young in Support of a Negative Determination 1/

Our determination in the instant investigation is negative because any increase in imports of articles like or directly competitive with transistors and diodes produced by the workers of the Buffalo N.Y., plant of the General Electric Company is not the result in major part of concessions granted under trade agreements.

Commissioner Leonard's reasoning in support of this determination on the above-named electronic products is set forth in statements of his views in two previous Commission reports. 2/ Neither of the earlier investigations involving semiconductor devices dealt specifically with diodes, as does the instant case. Since diodes, transistors, and receiving tubes are included under the same tariff provision and have the same concession history, however, the same reasoning on why increased imports are not the result in major part of concessions granted under trade agreements also applies to diodes. Moreover, the evidence obtained in the instant case further substantiates his earlier determinations with respect to semiconductor devices.

In the view of both Commissioners Leonard and Young, the information developed during the course of this investigation shows that the savings in production costs obtained by U.S. producers of semiconductors who have chosen to transfer production of such devices abroad far outweigh the cumulative effect of savings resulting from concession-

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1/ Chairman Bedell concurs in the result.

2/ Capacitors and Semiconductors: Sprague Electric Company, North Adams, Mass., . . . Investigation No. TEA-F-22 . . ., TC Publication 394, May 1971, pp. 3-4; Electronic Receiving Tubes and Transistors: Production and Maintenance Workers at RCA Corporation Plant, Cincinnati, Ohio

generated duty reductions--even utilizing as a base rate the 35 percent ad valorem rate of duty established in the Tariff Act of 1930, a rate which had already been reduced by more than two-thirds by the time transistors and diodes were available commercially.

The Commission obtained data from U.S. producers of semiconductor devices with respect to their costs of production for specific * * * manufactured in one of their U.S. plants and comparable data on their production costs for the same types of * * * made in one of their foreign plants. In * * * cases for which usable data were obtained, the savings resulting from lower costs of production in foreign countries far outweighed the savings caused by duty reductions resulting from trade-agreement concessions. In * * * examples, the savings resulting from lower costs of production in the foreign plants were about four times as large as any concession-generated savings in duty (even utilizing the 1930 rate as the base rate). * * *, the savings resulting from lower foreign costs of production were two and one-half times those which could be attributed to trade-agreement reductions in duty. Moreover, in * * * examples, the savings achieved by lower foreign labor costs alone were greater than the concession-generated duty savings.

Although many considerations must enter into any comparison of the costs of production in the United States with those in foreign countries, it is clear that any increased imports that caused the unemployment of the petitioning workers were much more likely to have resulted <u>in major part</u> from lower foreign production costs than from concessions granted

under trade agreements. If the increased imports were not the result in major part of concessions granted under trade agreements, then, under the Trade Expansion Act of 1962, an affirmative determination cannot be made.

INFORMATION OBTAINED IN THE INVESTIGATION

Description and Uses

The Buffalo plant of General Electric Co., prior to its closing in December 1972, produced various types of transistors and diodes, which are articles classified as active semiconductors. Semiconductors are devices with electrical conductivity characteristics between those of a conductor and an insulator. Silicon and germanium are materials commonly used in the production of semiconductors. To produce an active semiconductor device, an impurity is introduced into the semiconducting material to provide the necessary characteristics of the semiconductor such as the capability to amplify, rectify, or detect an electrical or electronic signal.

The three major types of active semiconductors are diodes, transistors, and integrated circuits. Diodes include most semiconductors having two terminals and, generally, are divided into three classes, i.e., rectifiers, signal diodes, and switches. 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 on the designed voltage-current characteristic; 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.

A transistor is most often a three-terminal device which can perform 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 transistors, diodes, resistors, capacitors, and inductors.

Semiconductor diodes and transistors have displaced vacuum tubes in many applications. However, vacuum-tube diodes and receiving tubes continue to be used, largely in high-current or high-voltage circuits and as replacements in equipment previously produced with the use of vacuum tubes.

Semiconductors are used widely in computers, communications equipment, consumer electronic products, and industrial equipment and controls.

U.S. Tariff Treatment

Transistors and diodes, as well as other semiconductors and receiving tubes, were not specifically provided for in the Tariff Act of 1930. They were dutiable, however, under paragraph 353 at 35 percent ad valorem as ". . . articles suitable for producing, rectifying, modifying, controlling, or distributing electrical energy . . . ." 1/ Under the Tariff Schedules of the United States (TSUS), effective

1/ Language exerpted from the Tariff Act of 1930. Transistors and diodes had not been invented when this language was adopted.

August 31, 1963, they were made dutiable under TSUS item 687.60 at the then existing rate of 12.5 percent ad valorem. Since January 1, 1972, the applicable rate has been 6 percent ad valorem. The rate history is shown in the following table.

Transistors and diodes and other semiconductor devices and receiving tubes: Change in U.S. rates of duty, June 18, 1930-Jan. 1, 1972

Effective date	Rate of duty	Authority
	Percent ad valorem	
June 18, 1930	35	Tariff Act of 1930
Jan. 1, 1939	25	Bilateral agreement with the United Kingdom.
Jan. 1, 1948	15	GATT 1/ concession
June 6, 1951	12.5	Do.
Aug. 31, 1963	12.5	Tariff Classification Act of 1962.
Jan. 1, 1968	11	GATT 1/ concession
Jan. 1, 1969	10	Do.
Jan. 1, 1970	8.5	Do.
Jan. 1, 1971 2/	7	Do.
Jan. 1, 1972	6	Do.

1/ General Agreement on Tariffs and Trade.
2/ An additional 10-percent import duty was imposed from Aug. 16, 1971, through Dec. 19, 1971 (Presidential Proclamations 4074 and 4098).

In addition to the fully dutiable imports entered under TSUS item 687.60, semiconductors are also entered under items 806.30 and 807.00. Item 806.30 provides for imports of certain metal articles for processing which have previously been processed in the United States and were exported for further processing. Article 807.00 provides for imported articles assembled in whole or in part of U.S.-fabricated components. Imports qualifying under those provisions, which have

never been the subject of trade-agreement concessions, are dutiable only to the extent of the value added abroad.

The tariff reductions on certain consumer electronic products in which semiconductors are used are shown in table 1 of the appendix.

U.S. Producers

The number of U.S. producers of transistors and diodes has generally declined since 1966. The number of U.S. manufacturers (with shipments valued at $100,000 or more) producing silicon transistors declined from 30 in 1967 to 25 in 1971; 1/ producers of germanium transistors declined from 17 to 12; those of silicon diodes, from 34 to 24; and those of germanium diodes, from 12 to 6. All the firms produced more than one of the products so that the total number of firms involved declined from about 35 to about 25. The number of producers of integrated circuits (with shipments valued at $100,000 or more) has remained at approximately 30 since 1967. Many manufacturers of integrated circuits also produce transistors and diodes. About six firms produced receiving tubes in both 1967 and 1971.

U.S. producers of semiconductors have effected rapid technological changes in the years since the transistor was first demonstrated in 1947. Many firms entered and many firms left the semiconductor industry as new products and new techniques were discovered.

1/ Available data on U.S. producers of semiconductors are contained in Department of Commerce, Current Industrial Reports, through 1971.

Most large U.S. producers are multinational firms with plants and offices in developed and undeveloped countries. A large share of the necessary manual assembly work is accomplished by subsidiaries of the U.S. producers situated in Republic of China, Republic of Korea, Hong Kong, Singapore, and Mexico.

U.S. Consumption and Trade

Semiconductors

U.S. consumption of semiconductors has grown greatly in recent years, but the growth has not been steady. In the 5-year period 1968-72, consumption boomed in 1969 and 1972, but declined or remained stable in 1970 and 1971. Thus, in terms of volume, apparent U.S. consumption of semiconductors increased from 3.1 billion units in 1968 to 4.3 billion units in 1969, declined to about 3.9 billion units in both 1970 and 1971, and then rose markedly to 6.1 billion units in 1972 (table 2). The demand for semiconductors in their major markets languished in late 1969, 1970, and 1971; total factory sales for those markets diminished from $28.7 billion in 1969 to about $27.0 billion in 1970 and 1971. In early 1971, demand began to rise and it has continued strong into 1973 as consumer and industrial sales have increased markedly. A shortage of semiconductors exists today with long deliveries being specified by producers. In terms of value, apparent consumption rose from $0.9 billion in 1968 to $1.0 billion in 1969, to $1.1 billion in 1971, and then to $1.7 billion in 1972.

The volume and value of U.S. producers' shipments were at a high point in 1969 and 1972, declining between those years. U.S. imports rose sharply in 1969 and 1972, but remained at about the 1969 level in 1970 and 1971. The ratio of imports to consumption rose steadily during 1968-72; it increased from 31 percent in 1968 to 49 percent in 1972 in terms of volume, and from 8 percent in 1968 to 19 percent in 1972 in terms of value.

As noted above, semiconductors consist of three major product areas--transistors, diodes, and integrated circuits. Change occurs in the three product areas as new products and technological improvement of existing products result in the substitution of one type of semiconductor for another. Recently, integrated circuits have been used more and more widely in place of transistors and diodes. The effect of this substitution is compounded because a single integrated circuit may substitute for hundreds of transistors and diodes as well as large quantities of passive components such as resistors, capacitors, and inductors. The substitution factor became greater from 1968 to 1972 with the introduction of new products such as medium-scale integration arrays and large-scale integration arrays having progressively larger substitution factors.

Although the average unit value of U.S. producers' shipments of semiconductors increased from $0.39 to $0.45 between 1968 and 1972, the average unit value of each of the individual product areas

declined. 1/ The apparent anomaly is explained by the increased share of consumption of semiconductors accounted for by integrated circuits. The average unit value of integrated circuits has declined but much higher than the average unit values of transistors and diodes. The increased share of apparent U.S. consumption represented by integrated circuits is shown in the following table.

Share of apparent U.S. consumption of semiconductors, by types, 1968-72

Type	1968	1969	1970	1971	1972
	Percent of total quantity				
Integrated circuits	1/	1/	13	17	20
Transistors	38	38	36	36	42
Diodes	1/	1/	51	47	38
Total	100	100	100	100	100
	Percent of total value				
Integrated circuits	1/	1/	42	50	61
Transistors	44	42	38	34	28
Diodes	1/	1/	20	16	11
Total	100	100	100	100	100

1/ Not separately available.

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

The great bulk of U.S. imports of semiconductors in recent years were classified under TSUS items 806.30 and 807.00 and were entered by a few U.S. firms * * *.

1/ Between 1968 and 1972 the average unit value of transistors has decreased from 47 cents to 32 cents and the average unit value of diodes has decreased from 15 cents to 14 cents. Between 1968 and 1971, the average unit value of integrated circuits has decreased from $2.23 to $1.47.

In 1972, imports under items 806.30 and 807.00 accounted for 84 percent, in terms of quantity, and 79 percent, in terms of value, of total imports of semiconductors. Those shares were the lowest in the last 5 years (table 3). However, such imports increased from 847 million units, valued at $59 million, in 1968 to 2,498 million units, valued at $249 million, in 1972 (table 4). The share of the duty-exempt value of those imports declined from 60 percent in 1968 to 51 percent in 1972, indicating that more foreign value was included in an average semiconductor imported in the latter year (table 5).

Transistors.--Apparent U.S. consumption of transistors increased from 1,203 million units, valued at $400 million, in 1968 to 1,614 million units, valued at $436 million, in 1969, declined to 1,389 million units, valued at $382 million, in 1971, and then rose to 2,580 million units, valued at $477 million, in 1972 (table 6). The quantity and value of U.S. producers' shipments and exports generally followed the same trend, as did the quantity of U.S. imports. The value of U.S. imports increased steadily from $45 million in 1968 to $100 million in 1972. The ratio of imports to consumption increased from 38 percent in 1968 to 55 percent in 1972 in terms of quantity, and from 11 percent in 1968 to 21 percent in 1972 in terms of value. Table 7 shows the rates of duty and the value of imports of transistors during 1964-72.

Silicon transistors constitute the bulk of apparent U.S. consumption of transistors. According to statistics supplied by the Electronic Industries Association, sales of silicon transistors in

1972 accounted for 95 percent of the quantity and 90 percent of the value of total factory sales of transistors. The following table shows the relative shares of total factory sales of silicon and germanium transistors.

Share of total factory sales of transistors, by types, 1968-72

Type	1968	1969	1970	1971	1972
	Percent of total quantity				
Silicon	77	82	85	90	95
Germanium	23	18	15	10	5
Total	100	100	100	100	100
	Percent of total value				
Silicon	79	81	84	87	90
Germanium	21	19	16	13	10
Total	100	100	100	100	100

Source: Compiled from statistics provided by the Electronic Industries Association.

Sales of silicon transistors surpassed those of germanium transistors in 1964 and 1965, and the share of sales represented by the germanium units has declined progressively since then. The data indicate that silicon transistors are replacing germanium transistors.

Diodes.--Apparent U.S. consumption of diodes decreased from 2,006 million units, valued at $211 million, in 1970 to 1,795 million units, valued at $176 million, in 1971, before rising to 2,292 million units, valued at $189 million, in 1972 (table 8). U.S. producers' shipments followed the same trend as that for transistors. Imports increased from 614 million units, valued at $28 million, in 1970 to 901 million units, valued at $36 million, in 1972.

Silicon diodes have constituted the bulk of apparent U.S. consumption of diodes since 1967. The following table shows the relative shares of total factory sales of silicon and germanium diodes.

Share of total factory sales of diodes, by types, 1968-72

Type	1968	1969	1970	1971	1972
	Percent of total quantity				
Silicon	65	74	73	83	85
Germanium	35	26	27	17	15
Total	100	100	100	100	100
	Percent of total value				
Silicon	82	86	84	87	88
Germanium	18	14	16	13	12
Total	100	100	100	100	100

Source: Compiled from statistics provided by the Electronic Industries Association.

The data indicate that silicon diodes are replacing germanium diodes.

Receiving tubes

Apparent U.S. consumption of receiving tubes declined steadily from 288 million units, valued at $241 million, in 1968 to 206 million units, valued at $199 million, in 1972 (table 9). U.S. producers' shipments followed the same trend. U.S. imports of receiving tubes, which were generally stable, accounted for an increasing share of apparent consumption in terms of value; the quantity and the value of imports fluctuated between 46 and 49 million units and 18 million and 21 million dollars, respectively, during 1968-72.

Consumption of receiving tubes has declined since 1966 as solid-state television receivers have become increasingly popular. As semiconductors have been improved for use in higher voltage applications, the uses for receiving tubes have become fewer.

Electronic end products

Most electronic end products are manufactured with semiconductors. Many consumer electronic products, such as television sets, radio receivers, and tape recorders, are imported in large quantities, as shown in tables 10, 11, and 12 in the appendix, but account for only about 17 percent of the value of U.S. factory sales of electronic end products. The bulk of the sales of electronic end products are in the military, industrial, and commercial markets, where imports are not a large factor in trade and, in fact, U.S. exports exceed U.S. imports. In 1971 the value of imports in the military, industrial, and commercial sectors was equivalent to 28 percent of the value of U.S. exports of those sectors. The value of those imports was about 3 percent of U.S. factory sales.

General Electric Co.

General Electric Co. (GE) is a large, multinational, multiproduct firm with numerous establishments in the United States and more than one establishment in many foreign countries. * * *.

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STATISTICAL APPENDIX

Table 1.--Certain consumer electronic products: Effective date of U.S. rates of duty, June 18, 1930-Jan. 1, 1972

(In percent ad valorem)

Effective date	Television receivers (item 685.20)	Radio receivers		Tape recorders and parts 1/ (TSUS item 685.40)	Tape players and parts 1/ (TSUS item 678.50)
		Solid-state (item 685.23)	Tube-type (item 685.25)		
June 18, 1930----	35	35		35	35
Jan. 1, 1939----	25	25		27.5	25
Jan. 1, 1948----	15	15		15	15
June 6, 1951----	12.5	12.5		13.75	13.75
June 30, 1956----	11.5	2/		2/	2/
June 30, 1957----	11	2/		2/	2/
June 30, 1958----	10.5	2/		2/	2/
July 1, 1962----	10	2/		12.5	12.5
July 1, 1963----	2/	2/		11.5	11.5
Aug. 31, 1963----	2/	2/		11.5	3/ 10
Jan. 1, 1968----	9	12	11	10	9
Jan. 1, 1969----	8	11.5	10	9	8
Jan. 1, 1970----	7	11	8.5	8	7
Jan. 1, 1971----	4/ 6	4/ 10.4	4/ 7	4/ 6.5	4/ 6
Jan. 1, 1972----	5	2/	6	5.5	5

1/ Parts of tape recorders and tape players include tape decks which are parts of the respective items.

2/ No change.

3/ This rate was a result of combining several different rates.

4/ An additional 10-percent import duty was imposed from Aug. 16, 1971, through Dec. 19, 1971 (Presidential Proclamations 4074 and 4098).

Table 2.--Semiconductors: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	U.S. producers' shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	2,436.4	980.4	270.4	3,146.4	31.2
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/ 3,563.0	2,979.4	468.6	6,073.8	49.1
	Value				
1968	958.7	71.5	125.6	904.6	7.9
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/ 1,617.5	316.4	229.6	1,704.3	18.6

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

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

Table 3.--Semiconductors: Share of total U.S. imports represented by imports under TSUS items 806.30 and 807.00, by types, 1968-72

Type	1968	1969	1970	1971	1972
	Percent of total quantity				
Integrated circuits	1/ 2/ 84	1/ 2/ 86	97	85	80
Transistors	89	92	91	86	87
Diodes	2/	2/	)		(81
Rectifiers	2/	2/	) 86	82	(88
Other	2/	2/	)		(81
Average	86	89	90	84	84
	Percent of total value				
Integrated circuits	1/ 2/ 77	1/ 2/ 81	95	87	79
Transistors	87	86	89	87	82
Diodes	2/	2/	)		(61
Rectifiers	2/	2/	) 3/ 72	3/ 69	(88
Other	2/	2/	)		(66
Average	84	84	88	85	79

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 4.--Semiconductors: Total U.S. imports under TSUS items 806.30 and 807.00, by types, 1968-72

Type	1968	1969	1970	1971	1972
	Quantity (million units)				
Integrated circuits	1/ 2/ 445.3	1/ 2/ 718.2	240.5	275.0	538.7
Transistors	402.1	646.3	548.1	481.7	1,223.3
Diodes	2/	2/	3/ 529.9	3/ 517.7	577.1
Rectifiers	2/	2/			72.2
Other	2/	2/			86.9
Total	847.4	1,364.5	1,318.5	1,274.5	2,498.2
	Value (million dollars)				
Integrated circuits	1/ 2/ 20.5	1/ 2/ 36.6	65.8	82.6	143.0
Transistors	38.8	50.7	53.1	52.8	81.8
Diodes	2/	2/	3/ 20.2	3/ 16.8	12.6
Rectifiers	2/	2/			7.5
Other	2/	2/			4.4
Total	59.4	87.3	139.1	152.2	249.4

1/ Data do not include integrated circuits imported under TSUS item 806.30. In 1968 the total value of integrated circuits entered under TSUS item 806.30 was approximately $2.8 million; 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, rectifers, and other semiconductors are aggregrated.

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 5.--Semiconductors: Share of total value of imports under TSUS items 806.30 and 807.00 represented by duty-exempt components, by types, 1968-72

(In percent)

Type	1968	1969	1970	1971	1972
Integrated circuits	1/ 2/ 66	1/ 2/ 64	59	54	54
Transistors	57	54	55	52	47
Diodes	2/	2/			(51
Rectifiers	2/	2/	3/ 52	3/ 54	(30
Other	2/	2/			(58
Average	60	58	56	53	51

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 6.--Transistors: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	874.8	451.4	123.4	1,202.8	37.5
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/ 1,384.0	1,408.3	212.3	2,580.0	54.6
	Value				
1968	406.7	44.7	51.1	400.3	11.1
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	1/ 438.0	100.1	61.3	476.8	21.0

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

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

Table 7.--Transistors: U.S. rates of duty and imports for consumption, 1964-72

Year	Rate of duty	Imports
	Percent ad valorem	Million dollars
1964	12.5	5.6
1965	12.5	15.1
1966	12.5	28.7
1967	12.5	26.7
1968	11	44.7
1969	10	59.0
1970	8.5	59.8
1971	7	60.4
1972	6	100.1

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

Table 8.--Diodes: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	1,413.9	1/	126.1	1/	1/
1969	1,762.4	1/	162.0	1/	1/
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	2/ 1,555.0	901.2	163.8	2,292.4	39.3
	Value				
1968	221.5	1/	38.4	1/	1/
1969	234.8	1/	55.5	1/	1/
1970	240.7	27.9	57.3	211.3	13.2
1971	200.8	24.5	49.6	175.7	13.9
1972	2/ 217.5	35.9	64.7	188.7	19.0

1/ Not available.
2/ Estimated by the U.S. Tariff Commission.

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

Table 9.--Receiving tubes: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	252.4	47.4	11.5	288.3	16.4
1969	231.4	48.7	11.9	268.2	18.2
1970	188.5	46.7	12.7	222.5	21.0
1971	175.4	47.9	10.7	212.6	22.5
1972	1/ 170.0	45.5	9.8	205.7	22.1
	Value				
1968	234.2	18.9	12.5	240.6	7.9
1969	224.2	18.4	13.2	229.4	8.0
1970	204.4	17.6	13.3	208.7	8.4
1971	196.6	18.7	12.7	202.6	9.2
1972	1/ 190.4	21.1	12.9	198.6	10.6

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

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

Table 10.--Television receivers: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	10,328	2,711	144	12,895	21
1969	8,721	4,034	157	12,598	32
1970	8,308	4,510	126	12,692	36
1971	8,664	5,447	162	13,949	39
1972	1/ 10,100	6,375	224	1/ 16,251	1/ 39
	Value				
1968	2,222	204	28	2,398	9
1969	1,852	296	33	2,115	14
1970	1,714	316	26	2,004	16
1971	1,960	413	37	2,336	18
1972	1/ 2,300	497	59	1/ 2,738	1/ 18

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

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

Table 9.--Receiving tubes: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	252.4	47.4	11.5	288.3	16.4
1969	231.4	48.7	11.9	268.2	18.2
1970	188.5	46.7	12.7	222.5	21.0
1971	175.4	47.9	10.7	212.6	22.5
1972	1/ 170.0	45.5	9.8	205.7	22.1
	Value				
1968	234.2	18.9	12.5	240.6	7.9
1969	224.2	18.4	13.2	229.4	8.0
1970	204.4	17.6	13.3	208.7	8.4
1971	196.6	18.7	12.7	202.6	9.2
1972	1/ 190.4	21.1	12.9	198.6	10.6

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

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

Table 10.--Television receivers: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	10,328	2,711	144	12,895	21
1969	8,721	4,034	157	12,598	32
1970	8,308	4,510	126	12,692	36
1971	8,664	5,447	162	13,949	39
1972	1/ 10,100	6,375	224	1/ 16,251	1/ 39
	Value				
1968	2,222	204	28	2,398	9
1969	1,852	296	33	2,115	14
1970	1,714	316	26	2,004	16
1971	1,960	413	37	2,336	18
1972	1/ 2,300	497	59	1/ 2,738	1/ 18

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

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

Table 11.--Home-type radio receivers: U.S. producers' shipments, imports for consumption, exports of domestic merchandise, and apparent consumption, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consumption	Ratio (percent) of imports to consumption
	Quantity				
1968	7,455	28,346	385	35,416	80
1969	5,940	34,677	329	40,288	86
1970	4,359	31,150	245	35,264	88
1971	2,570	30,988	224	33,334	93
1972	1/ 1,800	42,372	248	1/ 43,924	1/ 96
	Value				
1968	127	225	5	347	65
1969	102	306	5	403	76
1970	79	305	4	380	80
1971	58	307	3	362	85
1972	1/ 45	405	4	1/ 446	1/ 91

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

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

Table 12.--Audio home magnetic-type recorders and players: 1/ U.S. producers' shipments, imports for consumption, and new supply, 1966-71

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

Year	Shipments	Imports	New supply	Ratio (percent) of imports to new supply
	Quantity			
1966	868	2,807	3,675	76.4
1967	783	3,780	4,563	82.8
1968	659	4,914	5,573	88.2
1969	676	6,253	6,929	90.2
1970	381	6,580	6,961	94.5
1971	357	7,018	7,375	95.2
	Value			
1966	65,621	47,733	113,354	42.1
1967	56,719	72,583	129,302	56.1
1968	49,552	110,262	159,814	69.0
1969	55,723	142,743	198,466	71.9
1970	41,585	144,459	186,044	77.6
1971	22,869	158,171	181,040	87.4

1/ The data in this table, extracted from the Electronic Industries Association Yearbook, 1971, do not include the quantity and value of imported tape players and of combinations which include tape players, which are shown below. To obtain total imports of tape recorders and players, aggregate the data in the imports column above with those shown below on U.S. imports of tape players and combinations which include tape players, excluding those designed for use in automobiles:

Year	Quantity (1,000 units)	Value (1,000 dollars)
1968	1,254	26,863
1969	2,505	61,117
1970	3,655	113,612
1971	5,158	145,298

Source: The Electronic Industries Association and the U.S. Department of Commerce.

Note.--Data on exports are not shown here because they are not comparable with those on shipments and imports; annual exports of products like those shipped or imported are believed to have been nil or negligible during 1966-71.

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