

UNITED STATES TARIFF COMMISSION

ELECTRONIC RECEIVING TUBES AND MOUNTS:
WORKERS OF THE OWENSBORO, KY., PLANT OF
GENERAL ELECTRIC CO.

Report to the President
on Investigation No. TEA-W-217
Under Section 301(c)(2) of the Trade Expansion Act of 1962



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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,
January 4, 1974.

To the President:

In accordance with sections 301(f)(1) and (f)(3) of the Trade Expansion Act of 1962 (76 Stat. 872; 19 U.S.C. 1801), the U.S. Tariff Commission herein reports the results of investigation No. TEA-W-217 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 Owensboro, Ky., 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 November 9, 1973, 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 Owensboro, Ky., plant of the General Electric Co., New York, N.Y. The petition was received on November 5, 1973.

Public notice of the investigation was published in the Federal Register (38 F.R. 32297) on November 23, 1973. No public hearing was requested, and none was held.

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

Finding of the Commission

On the basis of its investigation, the Commission finds (Commissioners Leonard and Young dissenting and Vice Chairman Parker not participating) 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 Owensboro, Ky., 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 Chairman Bedell, Commissioner Moore,
and Commissioner Ablondi

This investigation relates to a petition for adjustment assistance under section 301 of the Trade Expansion Act of 1962 filed on behalf of the workers and former workers of the Owensboro, Kentucky, plant, of General Electric Company (GE) or an appropriate subdivision thereof, engaged in the production of electronic receiving tubes and electronic receiving tube mounts. Several other articles unrelated to receiving tubes or mounts including planar thyratron tubes, rebuilt color television tubes, reed switches, ceramic parts, and microwave modules, are also manufactured in the Owensboro plant. These represent a small portion of the production of the Owensboro plant. In 1970, General Electric established a facility in Singapore to manufacture receiving tube mounts.

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.

In this instance, it is our judgment that each of the four criteria outlined above has been met. Therefore, we have made an affirmative determination. A discussion of 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 1972--a * * * percent increase.

Imports of receiving tubes and tube mounts as separate articles have increased from * * * million units in 1968 to * * * million

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 savings represented by the trade-agreement concessions-- a reduction of 83 percent--was sufficiently large so as to provide an important price advantage for imported receiving tubes and tube mounts, whether imported as separate articles or in television sets, as compared to those domestically produced. Most domestic producers and importers of television receivers, as well as distributors of tubes for replacement markets have increased their imports largely for reasons of cost savings.

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 1968-72 in the Owensboro plant decreased each year from * * * in 1968 to * * * in 1972. This decrease continued in 1973 and in October the average number of such workers was * * *. In view of the foregoing, it is clear that a significant number of workers have been unemployed or underemployed 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 Owensboro plant. A direct relationship exists between the increased imports of receiving tubes and mounts and the unemployment of such workers. In order to improve its competitive position in the domestic tube industry, General Electric decided to establish a tube mount production facility in Singapore. In our opinion, General Electric would not have transferred the production of tube mounts to Singapore except for the advantages afforded by trade-agreement concessions. As concession-generated imports of receiving tubes and receiving tube mounts increased, employment related to these articles at the Owensboro plant steadily decreased. Accordingly, we conclude that the 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 Owensboro, Kentucky plant, of General Electric who are unemployed or underemployed are eligible to apply for adjustment assistance.

Views of Commissioners Leonard and Young

This investigation relates to a petition filed on behalf of workers at the Owensboro, Kentucky, plant of General Electric Co., for a determination under section 301(c)(2) of the Trade Expansion Act of 1962 of their eligibility to apply for adjustment assistance. Our determination is in the negative. Specifically, we have found that to the extent any articles like or directly competitive with those produced by the petitioning workers are being imported in increased quantities, such increased imports are not a result in major part of trade-agreement concessions.

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. In this case, as in past cases in which the workers concerned produced components of manufactured articles, we must decide what articles are like or directly competitive with those produced by the petitioning workers. We consider domestic and imported electronic receiving tubes and domestic and imported electronic receiving tube mounts to be "like". The "directly competitive" articles are limited, as a practical matter, to imported semiconductors of the types that have been replacing receiving tubes in such consumer electronic products as television receivers for some years. We do not regard

imported electronic products in which receiving tubes are used, or imported receiving tubes in those products, as being directly competitive with the electronic receiving tubes and/or mounts produced at Owensboro. 1/

U.S. imports of electronic receiving tube mounts and semiconductors have increased materially in recent years. The imports of mounts rose from * * * million units in 1968 to * * * million units in 1972. The imports of semiconductors increased from 980 million units in 1968 to 3 billion units in 1972. Contrary to the recent U.S. import experience with respect to receiving tube mounts and semiconductors, U.S. imports of receiving tubes remained fairly constant during 1968-71 (fluctuating between 46 million and 49 million units annually), but then dropped in 1972 (to 39 million units).

We have concluded that any increase in the imports of the above described components have not resulted in major part from trade-agreement concessions. The reasons for our conclusions are the same as those set forth in earlier cases. 2/ To summarize briefly, all of these products

1/ See our reasoning in Certain Variable Electrical Capacitors: All Star Products, Inc., Defiance, Ohio, . . . Investigation No. TEA-F-32 . . . , TC Publication 423, October 1971, pp. 5-8; and Loudspeakers: Workers of the Chicago, Ill., Plant of Jensen Manufacturing Division, Pemcor, Inc., . . . Investigation No. TEA-W-158 . . . , TC Publication 522, November 1972, pp. 6-10.

2/ Electronic Receiving Tubes and Transistors: Production and Maintenance Workers at RCA Corp., Plant, Cincinnati, Ohio, . . . Investigation No. TEA-W-89 . . . , TC Publication 396, May 1971, pp. 3-4; and Transistors and Diodes: Workers of the Buffalo, N.Y., Plant of General Electric Co., . . . Investigation No. TEA-W-196 . . . , TC Publication 588, June 1973, pp. 10-12.

are classified under the same tariff provision, have the same rate of duty, and have been subject to the same trade-agreement concessions. With each, there has been little causal connection between reductions in rates of duty resulting from trade-agreement concessions and changes in imports. The Kennedy Round concessions, the most recent that have been granted, effected reductions in already moderate rates of duty, but these were too small to have been the major cause of any increased imports of the products concerned. Earlier trade-agreement concessions, which resulted in substantial reductions in the rates of duty, did not result in significantly increased imports. Finally, it was found with respect to semiconductors that the savings in production costs obtained by U.S. producers who transferred production abroad far outweighed the cumulative effect of savings from concession-generated duty reductions.

INFORMATION OBTAINED IN THE INVESTIGATION

Description and Uses

The principal products of the Owensboro, Ky., plant of General Electric Co., are electronic receiving tubes and mounts. 1/

General Electric does not import electronic receiving tubes but does import some electronic receiving tube mounts from its Singapore plant. These mounts are used in the company's tube manufacturing operations in Owensboro, Ky.

Electronic receiving tube mounts are consumed in electronic receiving tubes, which in turn, are 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 mount, sealing the envelope to the base,

1/ Other unrelated products manufactured in Owensboro, engaging less than *** percent of the workers, and not listed in the petition, include planar thyatron tubes, rebuilt color-television tubes, reed switches, ceramic parts, and microwave modules. There have been no scheduled layoffs in these product areas.

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 General Electric's Owensboro and Tell City plants, 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 General Electric's Singapore plant.

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 General Electric's Owensboro or Tell City plants.

Diodes include most semiconductors having two terminals; i.e., rectifiers, signal diodes, and switches. ^{1/} A transistor is most 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 equipment previously produced which utilize receiving tubes. The largest market for receiving tubes at present is for original equipment and replacement use in television receivers.

^{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.

U.S. Tariff Treatment

Electronic receiving tubes and mounts, the articles produced at the Owensboro, Ky., 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. 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 (1973) 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	35
Jan. 1, 1939-----	Trade agreement with the United Kingdom.	25	25
Jan. 1, 1948-----	GATT concession	15	15
Jan. 6, 1951-----	-----do-----	12.5	12.5
June 30, 1956-----	-----do-----	12.5	11.5
June 30, 1957-----	-----do-----	12.5	11
June 30, 1958-----	-----do-----	12.5	10.5
July 1, 1962-----	-----do-----	12.5	10
Aug. 31, 1963-----	1/	12.5	10
Jan. 1, 1968-----	GATT concession	11	9
Jan. 1, 1969-----	-----do-----	10	8
Jan. 1, 1970-----	-----do-----	8.5	7
Jan. 1, 1971 <u>2/</u> -----	-----do-----	7	6
Jan. 1, 1972-----	-----do-----	6	5

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).

U.S. Producers

Three large producers of electronic receiving tubes in the United States account for nearly all of the domestic production--RCA Corp., General Electric Co., and GTE Sylvania. All of these firms produce some of the electronic receiving tube mounts which they consume in their production of receiving tubes. All three companies also import some of their mounts from foreign affiliates located in Brazil, Mexico, and Singapore. One of the three utilizes two domestic subcontractors to assemble mounts out of parts supplied by this producer.

U.S. producers of semiconductors (most are multinational firms with plants and offices in less developed, as well as developed countries) have effected rapid technological changes in the years since the transistor was first demonstrated in 1947. Subsidiaries of the U.S. producers, situated in The Republic of China, Hong Kong, Singapore, and Mexico, accomplish a large share of the necessary manual assembly work. Many firms entered and many firms left the semiconductor industry as new products and new techniques were developed.

The number of U.S. producers of transistors and diodes (with shipments valued at \$100,000 or more) has * * * declined from about 35 in 1966 to about 25 in 1971. ^{1/} 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.

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

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 over 95 percent of U.S. production of electronic receiving tubes, and consequently, of the consumption, shipments, and imports of tube mounts.

Electronic receiving tubes

Consumption of receiving tubes 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 from 290 million units, valued at \$242 million, in 1968 to 190 million units, valued at \$184 million, in 1972 (table 2). For the January-September 1973 period, tube consumption amounted to 118 million units, valued at \$108 million, as compared with 142 million units, valued at \$138 million, for the corresponding 1972 period.

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 254 million units, valued at \$236 million, in 1968 to 160 million units, valued at \$178 million, in 1972. These shipments amounted to 93.7 million units, valued at \$101 million, in January-September 1973, compared with 120 million units, valued at \$131 million, for the corresponding period of 1972.

U.S. annual imports of receiving tubes were generally stable in quantity and value in the years 1968-71--ranging from 46.0 million to 48.7 million units and from \$17.6 million to \$18.9 million annually in those years. In 1972, the quantity of receiving tubes imported dropped by about a sixth to 39.4 million units, although the value (\$18.7 million) changed little from previous years. In January-September 1973 imports of receiving tubes were slightly larger in quantity than in the corresponding period of the previous year (31.6 million, compared with 30.4 million units), but slightly smaller in value (\$15.6 million, compared with \$16.3 million). In terms of quantity, the share of annual domestic consumption of receiving tubes supplied by imports was stable in 1970-72 (close to 21 percent in each year); that share was somewhat larger in those years than in 1968 (16 percent) and 1969 (18 percent). The share accounted for by imports in January-September 1973 was slightly larger than in the corresponding period of 1972 (27 percent, compared with 25 percent). Table 3 shows the U.S. rates of duties and the value of U.S. imports of electronic receiving tubes during the period 1964-72; 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 shows that imports of tubes, as components of imported television receivers, increased from 37.9 million tubes in 1968 to 63.0 million in 1972.

Total number of electronic receiving tubes contained in imported television receivers, based on average tube complement and imports of television receivers, 1968-72

Year	Imports		Average tube complement ^{1/}		Total number
	Color	Black and white	Color	Black and white	of tubes
	receivers	receivers	receivers	receivers	contained in imported television receivers ^{1/}
	<u>1,000</u>	<u>1,000</u>	<u>Units</u>	<u>Units</u>	<u>Million</u>
	<u>units</u>	<u>units</u>	<u>per set</u>	<u>per set</u>	<u>units</u>
1968-----	670	2,045	20	12	37.9
1969-----	910	3,120	18	12	53.8
1970-----	915	3,600	16	11	54.1
1971-----	1,280	4,170	12	11	61.1
1972-----	1,330	5,100	9	10	63.0
-----	:	:	:	:	:

^{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 table below, imports of receiving tubes entered under TSUS item 807.00 (primarily units assembled by foreign subsidiaries of U.S. firms in Taiwan and Mexico) increased markedly in 1971 and 1972. There were no imports reported under this classification in 1969 and 1970 and imports were very small in 1968. Imports entered under item 807.00 accounted for about 8 percent of total imports in 1972. The share of the total value of the imports under item 807.00 accounted for by U.S. components declined from 79 percent

in 1971 to 68 percent in 1972. This share is expected to decline further in the future as U.S.- and foreign-owned firms increase production of parts for electronic receiving tubes in the Far East and Mexico.

Electronic receiving tubes: U.S. imports entered
under item 807.00, 1968-72

Item	1968	1969	1970	1971	1972
Quantity---units--	13,299	-	-	1,572,073	5,969,307
Total value					
dollars--	8,927	-	-	346,630	1,654,781
Value of U.S.					
components, duty:					
exempt-dollars--	1,149	-	-	274,531	1,120,475
Foreign value					
added--dollars--	7,778	-	-	72,099	534,306

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 12.9 million units, valued at \$2.4 billion, in 1968 to 16.4 million units, valued at \$2.7 billion, in 1972 (table 4). Even though color receivers, which are more expensive than monochrome units, accounted for a larger share of consumption in 1972 than in 1968, the growth in value of consumption during this period (an increase of 12 percent) was not commensurate with the growth in the quantity of consumption (an increase of 27 percent). This disparity reflects a marked decline in the prices of both monochrome and color receivers and a trend towards increased consumption of small- and medium-screen-size portable and table model sets.

Despite the increase in apparent consumption, U.S. producers' shipments of domestically produced television receivers (monochrome and color) declined sharply from 10.3 million units, valued at \$2.2 billion, in 1968 to 8.7 million units, valued at \$2.0 billion, in 1971, and then increased to 10.2 million units, valued at \$2.2 billion, in 1972. On a quantity basis, the share of total shipments of domestically produced units represented by monochrome receivers declined from about 50 percent in 1968 to about 27 percent in 1972.

During 1968-72, annual U.S. imports of television receivers (monochrome and color) increased each year--rising from 2.7 million units, valued at \$204 million, in 1968 to 6.4 million units, valued at \$497 million, in 1972 (table 4). The rates of duty and the value of imports of television receivers during 1964-72 are shown in table 5; data on imports in earlier years are not available.

As indicated in the table below, 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 rapidly during 1968-72. Imports entered under item 807.00 accounted for 29 percent of total imports in 1972, compared with 11 percent in 1968 (based on value).

Television receivers: U.S. imports entered under item 807.00,
1968-72

Item	1968	1969	1970	1971	1972
Quantity-----1,000 units--	445	940	1,197	1,423	2,765
Total value-----million dollars--	21.6	47.0	56.1	71.9	144.5
Value of U.S. components, duty exempt-----million dollars--	5.8	17.7	19.7	22.4	30.5
Foreign value added, dutiable million dollars--	15.8	29.3	36.4	49.5	114.0

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 due to the introduction of new products utilizing these components and 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 88 percent in quantity during 1968-72. Apparent consumption of semiconductors increased from 3.1 billion units, valued at \$0.9 billion, in 1968 to 4.3 billion units, valued at \$1.0 billion, in 1969, declined 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 (table 6). During 1968-72, the average unit value of transistors, diodes, and integrated circuits declined from 47 cents to 32 cents, from 16 cents to 15 cents, and from \$2.23 to \$1.16, respectively. The growth, both absolute and relative, in the importance of integrated circuits, is shown in the table on the following page.

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

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

U.S. producers' shipments of semiconductors increased from 2.4 billion units, valued at \$959 million in 1968, to 3.2 billion units, valued at \$1.2 billion in 1969. The quantity decreased in 1970 and 1971 amounting to 2.7 billion units in 1971. The value of these shipments remained fairly constant at approximately \$1.1 billion from 1969 through 1971. In 1972 both quantity and value increased to 3.4 billion units, valued at \$1.3 billion.

Imports generally increased from 980 million units, valued at \$71.5 million in 1968, to 3.0 billion units, valued at \$316 million in 1972. The ratio of imports to consumption rose steadily during 1968-72; it increased from 31 percent in 1968 to 51 percent in 1972 in terms of volume, and from 8 percent in 1968 to 22 percent in 1972 in

terms of value. Table 7 shows the rates of duty and the value of imports of semiconductors during 1964-72; data on imports for earlier years are unavailable.

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 86 percent, in terms of quantity, and 84 percent, in terms of value, of total imports of semiconductors in 1968 (980 million units, valued at \$71.5 million). This compares with 84 percent and 79 percent, respectively, of total imports of semiconductors in 1972 (3.0 billion units, valued at \$316 million, table 6). However, such imports increased from 847 million units, valued at \$59 million, in 1968 to 2.5 billion units, valued at \$249 million, in 1972 (table 9). The share of the duty-exempt value of those imports declined from 60 percent in 1968 to 51 percent in 1972.

Transistors.--Apparent U.S. consumption of transistors increased from 1.2 billion units, valued at \$400 million, in 1968 to 1.6 billion units, valued at \$436 million, in 1969, declined to 1.4 billion units, valued at \$382 million, in 1971, and then rose to 2.5 billion units, valued at \$445 million, in 1972 (table 10). 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 57 percent in 1972, in terms of quantity, and from 11 percent in 1968 to 23 percent in 1972, in terms of value. Table 7 shows duty rates and values of imports of transistors during 1964-72.

Diodes.--Apparent U.S. consumption of diodes decreased from 2.0 billion units, valued at \$211 million, in 1970 to 1.8 billion units, valued at \$176 million, in 1971, before rising to 2.3 billion units, valued at \$208 million, in 1972 (table 11). 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.

Integrated circuits.--Apparent U.S. consumption of integrated circuits increased from 474 million units in 1970 to 1.2 billion units in 1972, an increase of 149 percent (table 12). Similarly, the value increased from \$434 million to \$774 million during this period, an increase of 78 percent. U.S. producers' shipments of integrated circuits followed the same trend as consumption, increasing from 292 million units, valued at \$465 million in 1970, to an estimated 605 million units, valued at \$699 million, in 1972. Imports of integrated circuits increased from 249 million units, valued at \$69 million, in 1970 to 670 million units, valued at \$180 million, in 1972. Exports, however, declined from 66 million units, valued at \$100 million, in 1970 to 54 million units, valued at \$91 million, in 1971, but increased sharply in 1972 to 92 million units, valued at \$106 million.

The ratio of imports to consumption declined from 52.4 percent in 1970 to 49.3 percent in 1971, and then increased to 56.7 percent in 1972 in terms of quantity. However, in terms of value, this ratio steadily increased from 16.0 percent in 1970 to 23.3 percent in 1972. Table 7 shows the rates of duty and the value of imports of integrated circuits during 1964-72.

General Electric Co.

General Electric Co. (GE) with headquarters in New York City is a large multinational, multiproduct firm with numerous establishments in the United States and foreign countries. Foreign sales account for approximately 17 percent of total sales of products and services which in 1972 were over \$10 billion, double the 1963 figure. In 1971 General Electric was number four on Fortune magazine's directory of the 500 largest firms. Worldwide employment had reached 369,000 in 1972.

GE is organized into ten operational groups. The group concerned with the articles in this investigation is the Components and Materials Group, which in turn is subdivided into four operating divisions: the Electronic Components Division, the Medical Systems Division, the Appliance Components Division, and the Chemical and Metallurgical Division.

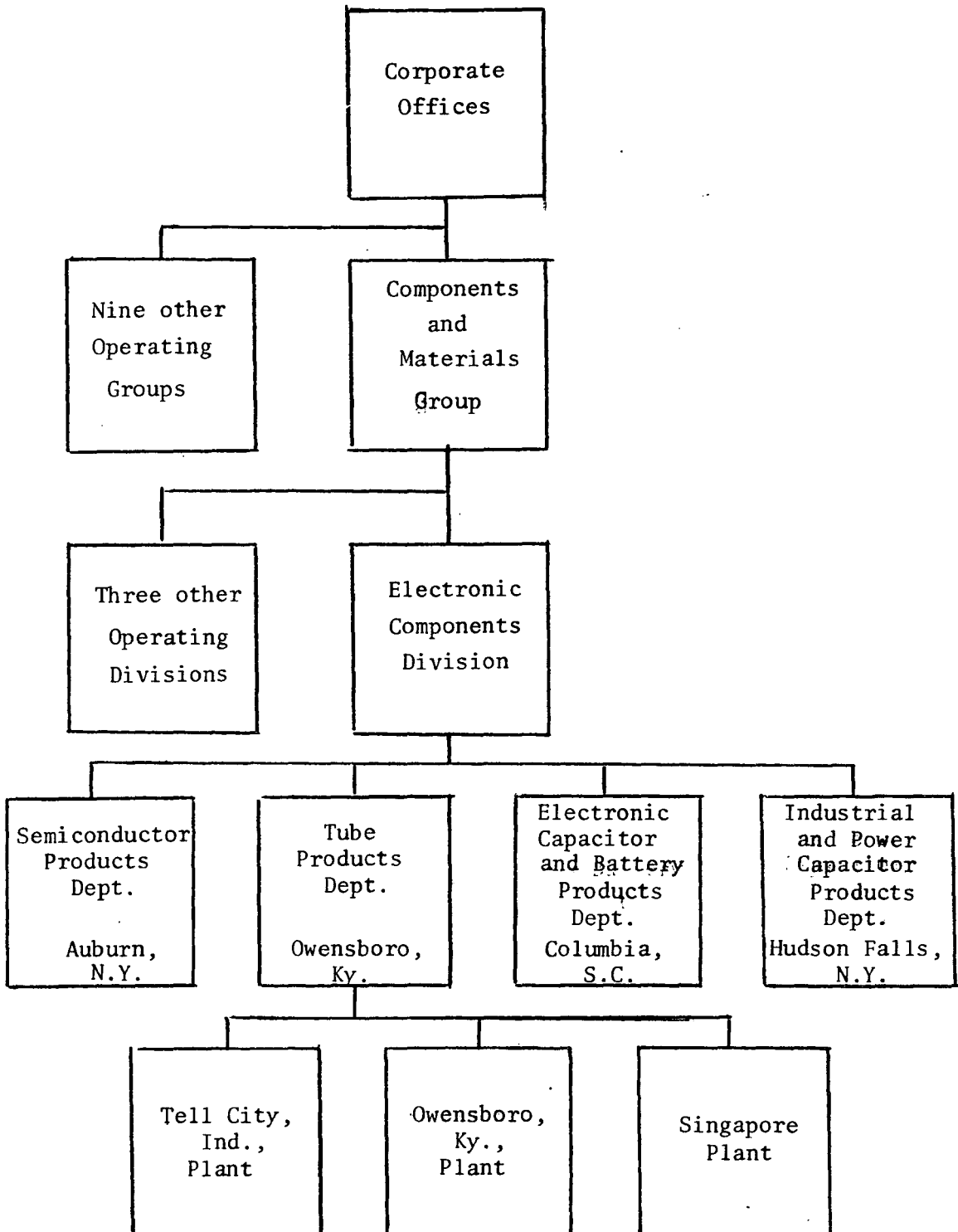
The Tube Products Department, headquartered in Owensboro, Ky., is one of four departments within the Electronic Components Division. This department has direct responsibility for the production of electronic receiving tubes and mounts. Electronic receiving tubes and mounts are produced in the Owensboro, Ky., and Tell City, Ind., plants; mounts are produced in the GE Singapore plant. These facilities are operated by the GE Tube Products Department. A simplified organizational chart of GE is shown on page A-21.

Owensboro, Ky., plant

GE has facilities at two locations in Owensboro, Ky., which are a few miles apart. On Hartford Road, the company has a complex of five single-story buildings that house tube component manufacturing, mount assembly, and tube finishing operations, as well as the rebuilding of color picture tubes. On 9th Street, the company has a complex of nine multistory buildings in which ceramic parts, planar thyratron tubes, reed switches, and microwave modules are produced.

* * * * *

General Electric Co.
Simplified Organizational Chart



A-22 through A-31

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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, 1968-72, January-September 1972 and January-September 1973

(Quantity in millions of units; value in millions of dollars)					
Period	Producers' shipments <u>1/</u>	Imports <u>2/</u>	Exports	Apparent consumption	Ratio (percent) of imports to consumption
Quantity					
1968-----	254.2	47.4	11.5	290.1	16.3
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
January-September--					
1972-----	119.7	30.4	7.8	142.3	24.5
1973-----	93.7	31.6	7.5	117.8	26.8
Value					
1968-----	235.9	18.9	12.5	242.3	7.8
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
January-September--					
1972-----	<u>3/</u> 131.4	13.8	10.0	135.2	10.2
1973-----	<u>3/</u> 101.0	14.8	9.1	106.7	13.9

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 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.

Table 3.--Electronic receiving tube mounts and tubes: U.S. rates of duty and imports for consumption, 1964-72

Year	Rate of duty	Imports	
		Mounts	Tubes
	Percent ad valorem	Million dollars	Million dollars
1964-----	12.5	1/	15.2
1965-----	12.5	1/	25.7
1966-----	12.5	1/	33.3
1967-----	12.5	1/	21.3
1968-----	11	0.3	18.9
1969-----	10	.3	18.4
1970-----	8.5	.6	17.6
1971-----	7	4.9	18.0
1972-----	6	9.0	18.7

1/ Not available.

Source: Compiled from official statistics of the U.S. Department of Commerce and from data supplied to the U.S. Tariff Commission by importers of electronic receiving tube mounts in response to the Commission's questionnaire.

Table 4.--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	4,033	157	12,597	32
1970-----	8,308	4,512	126	12,694	36
1971-----	8,740	5,449	162	14,027	39
1972-----	10,219	6,376	224	16,371	39
Value					
1968-----	2,222	204	28	2,398	9
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

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, 1964-72

Year	Rate of duty	Imports		
		Monochrome	Color	Total
	<u>Percent</u> <u>ad valorem</u>	<u>Million</u> <u>dollars</u>	<u>Million</u> <u>dollars</u>	<u>Million</u> <u>dollars</u>
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

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, 1968-72

(Quantity in millions of units; value in millions of dollars)						
Year	U.S. producers' shipments	Imports	Exports	Apparent consump- tion	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	3,896.0	37.6	
1971-----	2,655.7	1,516.3	331.3	3,840.7	39.5	
1972-----	1/ 3,393.7	2,979.4	460.6	5,904.6	50.5	
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	1,126.6	15.9	
1972-----	1,342.4	316.4	229.6	1,427.3	22.2	

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.--Semiconductors, by type: U.S. rates of duty and imports for consumption, 1964-72

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	44.7	1/	1/	71.5
1969-----	10	59.0	1/	1/	104.3
1970-----	8.5	59.8	27.9	69.4	157.2
1971-----	7	60.4	24.5	94.2	179.1
1972-----	6	100.1	35.9	180.5	316.4

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, 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 9.--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--	<u>1/2/</u> 445.3	<u>1/2/</u> 718.2	240.5	275.0	538.7
Transistors-----	402.1	646.3	548.1	481.7	1,223.3
Diodes-----	<u>2/</u>	<u>2/</u>	)		( 577.1
Rectifiers-----	<u>2/</u>	<u>2/</u>	) <u>3/</u> 529.9	<u>3/</u> 517.7	(72.2
Other-----	<u>2/</u>	<u>2/</u>	)		( 86.9
Total-----	847.4	1,364.5	1,318.5	1,274.5	2,498.2
Value (million dollars)					
Integrated circuits--	<u>1/2/</u> 20.5	<u>1/2/</u> 36.6	65.8	82.6	143.0
Transistors-----	38.8	50.7	53.1	52.8	81.8
Diodes-----	<u>2/</u>	<u>2/</u>	)		( 12.6
Rectifiers-----	<u>2/</u>	<u>2/</u>	) <u>3/</u> 20.2	<u>3/</u> 16.8	(7.5
Other-----	<u>2/</u>	<u>2/</u>	)		( 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, 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, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consump- tion	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-----	1,259.0	1,408.3	212.3	2,455.0	57.4
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-----	406.1	100.1	61.3	444.9	22.5

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, 1968-72

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

Year	Shipments	Imports	Exports	Apparent consump- tion	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-----	1,529.7	901.2	163.8	2,267.1	39.8
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-----	237.0	35.9	64.7	208.2	12.7

1/ Not separately 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, 1970-72

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

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

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 1968 and 1969 and, thus, are not available.

A-45 through A-53

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