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THE ELECTRONIC INDUSTRY SECTOR IN BRAZIL*

by

S. Wajnberg**

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** Executive Secretary of GEICOM (Interministerial Executive Group for Components and Raw Materials) - Communications Ministry, Rua Acra, Rio de Janeiro, Brazil.

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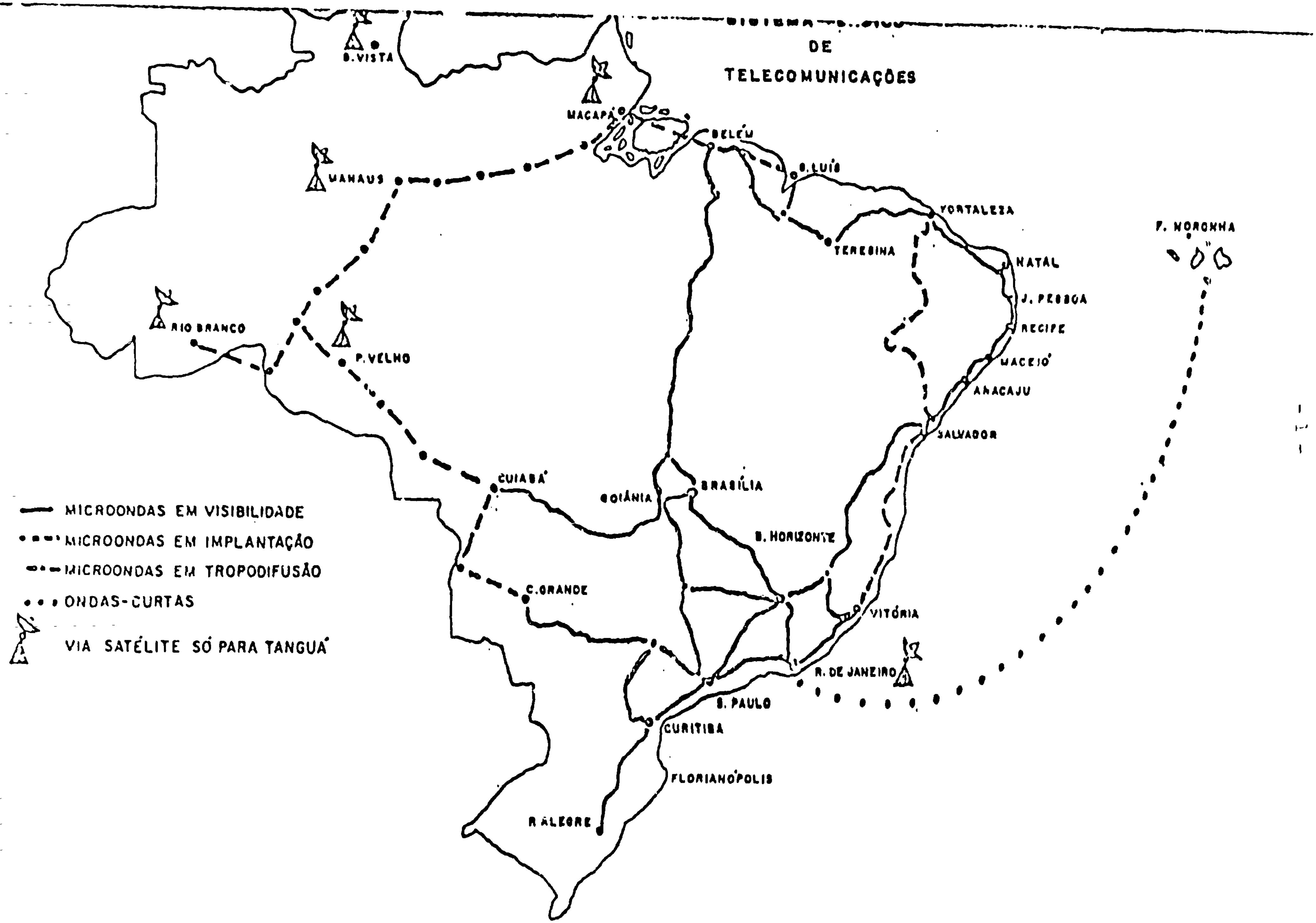

DE
TELECOMUNICAÇÕES
B. VISTA
MACAPÁ
BELÉM
S. LUÍS
MANAUS
FORTALEZA
F. NORONHA
TERESINA
NATAL
J. PESSOA
RIO BRANCO
RECIFE
P. VELHO
MACEIÓ
ARACAJU
SALVADOR
CUIABÁ
GOIÂNIA
BRASÍLIA
B. HORIZONTE
C. GRANDE
VITÓRIA
R. DE JANEIRO
S. PAULO
CURITIBA
FLORIANÓPOLIS
P. ALEGRE
MICROONDAS EM VISIBILIDADE
MICROONDAS EM IMPLANTAÇÃO
MICROONDAS EM TROPODIFUSÃO
ONDAS-CURTAS
VIA SATÉLITE SÓ PARA TANGUÁ

PRODUTO BRASILEIRO

PIB REAL E PIB PER CAPITA DO BRASIL

ANOS	PIB REAL		POPULAÇÃO		PIB REAL PER CAPITA	
	(US$ bilhões)	Variação %	(milhões hab.)	Variação %	(US$ mil)	Variação%
70	79,8	-	93,4	-	854	--
71	90,4	13,3	96,0	2,8	942	10,2
72	101,0	11,7	98,7	2,8	1.023	8,6
73	115,1	14,0	101,4	2,7	1.135	11,0
74	126,4	9,8	104,2	2,8	1.213	6,8
75	133,5	5,8	107,2	2,9	1.245	2,6
76	145,5	9,0	110,1	2,7	1.321	6,1
77	152,3	4,7	113,2	2,8	1.345	1,8
78	161,4	6,0	116,4	2,8	1.387	3,1
79	171,8	6,4	119,7	2,8	1.435	3,5
Variação % média 70a79	-	8,9	-	2,8	-	5,9

DEZEMBRO 1979

RENDA REAL ** DOS PRINCIPAIS SETORES ECONÔMICOS DO BRASIL

US$ BILHÕES

A N O S	AGROPECUÁRIA	INDÚSTRIA	COMÉRCIO	TRANSPORTES E COMUNICAÇÕES
70	10,2	23,0	10,4	3,6
71	11,3	26,3	11,8	3,8
72	11,8	29,8	13,3	4,3
73	12,2	34,6	15,3	5,0
74	13,3	38,0	16,7	5,7
75	13,7	40,3	17,3	6,3
76	14,3	44,6	18.8	6,8
77	15,7	46,4	19,5	7,1
78	15,4	50,1	20,6	7,6
79	15,9	53,6	21,9	8,3

DEZEMBRO 1979

** PRODUTOS MENOS IMPOSTOS INCIDENTES SOBRE PRODUÇÃO

TAXAS DE CRESCIMENTO DO PRODUTO REAL DOS PRINCIPAIS

SETORES ECONÔMICOS DO BRASIL

(em % ao ano)

A N O S	AGROPECUÁRIA	INDÚSTRIA	COMÉRCIO	TRANSPORTES E COMUNICAÇÕES
70	1,0	10,4	10,3	10,5
71	11,4	14,3	14,1	7,4
72	4,1	13,4	12,7	11,9
73	3,5	15,8	14,8	17,1
74	8,5	9,9	9,3	12,7
75	3,4	6,2	3,5	11,8
76	4,2	10,7	8,7	7,5
77	9,6	3,9	3,5	4,1
78	1,7	8,1	5,9	6,8
79	3,2	6,9	6,3	10,1
Variação % média 70a79	4,7	9,9	8,8	9,9

A nation in development which wants to create a healthy electronic industry, based in natural economical laws, must develop first, an industry of equipment which needs; even when in an initial stage, to import the parts to be assemble, while it organizes and trains its human resources. That is, in the first place it must achieve its own internal market, in order that through an adequate demand, this internal market, be able to furnish an industrial scale, to allow the growing of the industry of electronics and materials necessary for its verticalization and establishes a working market to stimulate the organization of specific human resources.

Once having achieved the internal market, the second stage will be the substitution of the external supply and the beginning of local developed equipment projects.

Basically, in these rules it is evaluated the scale of priorities of the governmental incentives to stimulate the local production of equipments and electronic components that, in the lack of an industrial scale or due to unfavourable interests ara not yet produced in Brazil.

There are of vital importance for the maintenance of this market the forecast of new types of equipments and components to be used in a long or medium term, as well as investments in research and development of these devices.

THE ELECTRONIC SECTOR

The World Market for Electronic Equipments in 1980 was of 180 billion dollars. 165 billion regarding the United States market, Occidental Europe and Japan. The Brazilian participation was of about 4 billion dollars.

Chart I, shows the distribution of this market by the mentioned countries from 1977 to 1980.

The distribution of electronic equipment in the Brazilian market from 1977 to 1982 can be seen in next chart. The growth of the Brazilian electronic sector was in 1978 of 4,7% and in 1979 of 10,3%.

For 1980 this growth is estimated in about 19% due to the great growth in the industry of radio and television.

In 1980 the Brazilian market reached the value of 3.5 billion dollars, of which 2,2 billion dollars corresponded to the Communications Sector as follows:

- Telecommunications	700 million dollars
- Radiodiffusion receivers (radio and television)	1.850 million dollars
- Transmitters and studio equipment for radiodiffusion	40 million dollars

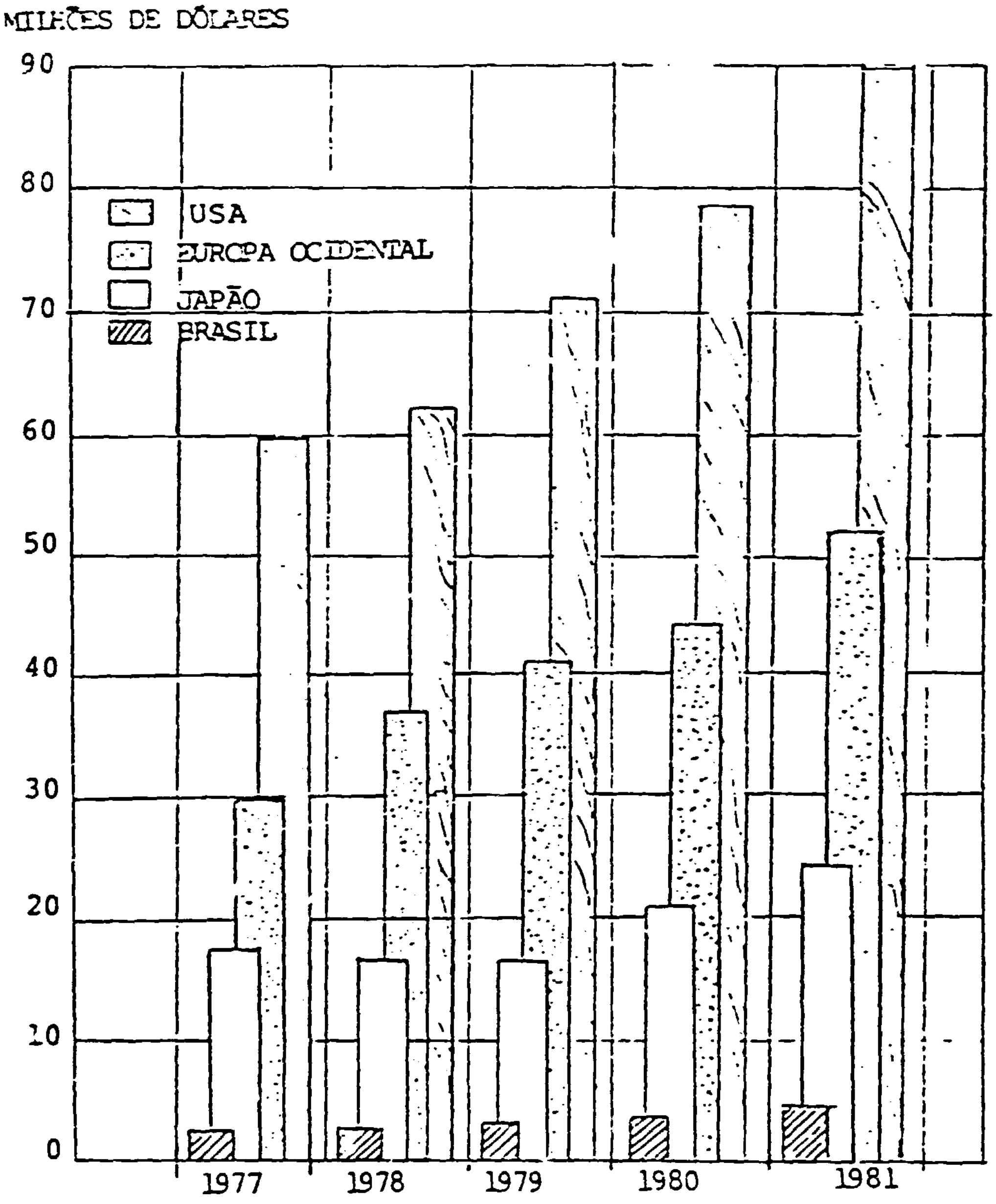
The other sectors had a participation of 900 million dollars as follows:

- Computers 430 million dollars
- Instruments and control 60 million dollars

- Medicine 45 million dollars
- Consumers equipment* 350 million dollars

* Regards calculators, record players, cassets, amplifiers without radio, watches, etc.

MERCADO MUNDIAL DE EQUIPAMENTOS ELETRÔNICOS



MERCADO BRASILEIRO DE EQUIPAMENTOS ELETRÔNICOS

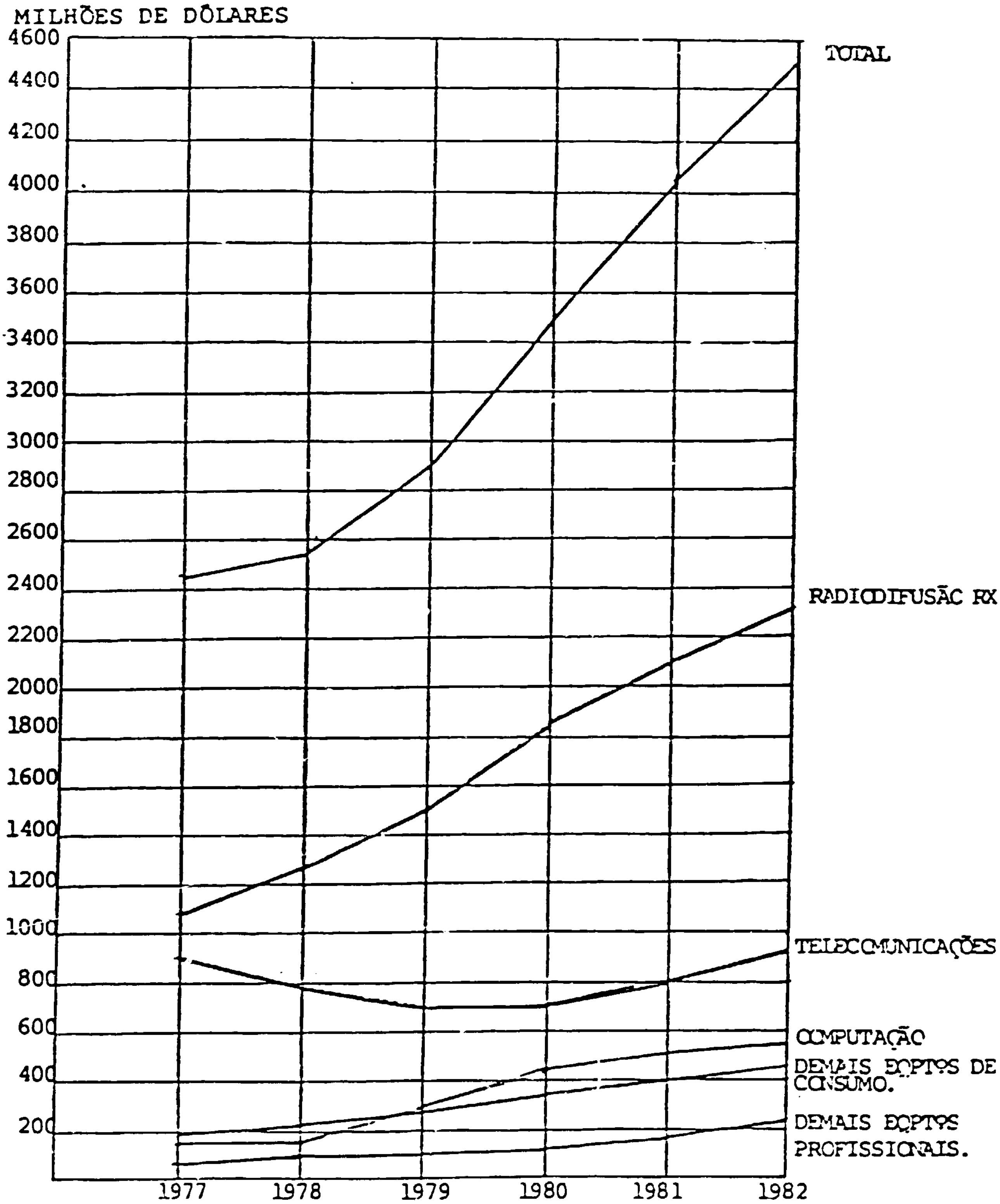
MILHÕES DE DÓLARES

EQUIPAMENTOS	1977	1978	1979	1980	1981	1982
Telecomunicações **	912	796	703	700	800	900
Radiodifusão	30	40	40	40	50	50
Receptores de Radiodifusão (Rd e TV)	1080	1252	1490	1854	2100	2300
Demais equipamentos de Consumo *	195	224	279	344	400	460
Computação	160	172	291	432	506	570
Instrumentação e Controle	49	51	55	60	70	80
Defesa	20	22	26	30	50	80
Medicina	22	26	35	45	60	80
TOTAL Profissional	1179	1095	1140	1297	1526	1750
TOTAL de Equipamentos de Consumo	1275	1476	1769	2198	2500	2760
TOTAL GERAL	2468	2583	2919	3505	4046	4520

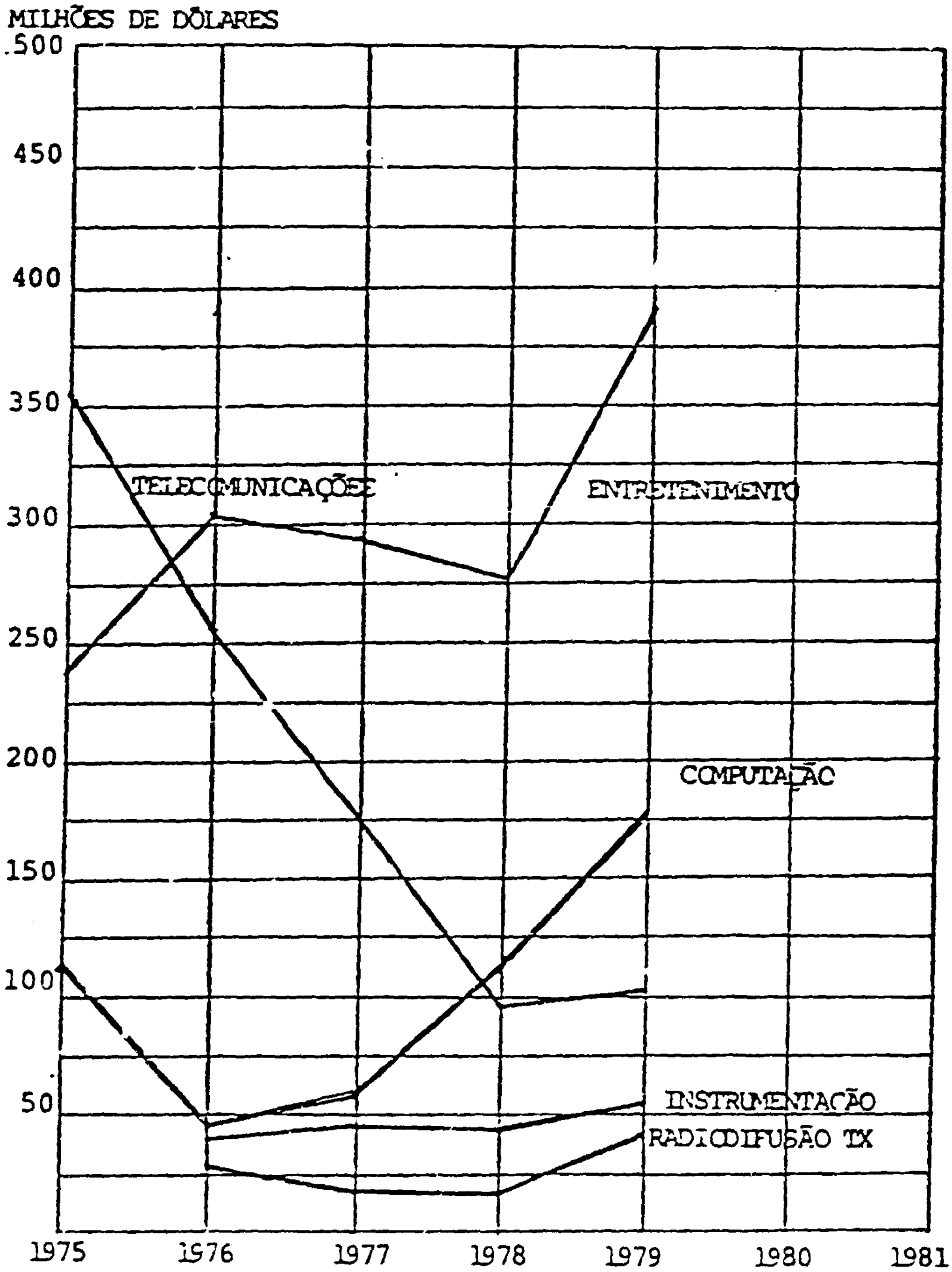
* Inclui calculadores, relógios eletrônicos, toca discos, amplificadores sem rádio.

** Não inclui serviços.

MERCADO BRASILEIRO DE EQUIPAMENTOS ELETRÔNICOS



IMPORTAÇÕES DO SETOR ELETRÔNICO



THE TELECOMMUNICATIONS SECTOR

In the initial period of growth of the National Telecommunications System, the Government, through its several offices and the enterprizes of this sector, stimulated the installation of a great number of industries.

By that time, the inexistence of an industrial policy consisted of a weak point, being responsible for the lack of standards and the stimulus to the establishment of national enterprizes to supply this branch and avoid the verticalization of the great multinational companies, who were the only ones to present themselves at that time to request for the expansion of the Telecommunications System.

From 1973 to 1975, several industries with the intention to fix down an irreversible position in the market, undertook orders above their limits of productive capacity and, consequently, completing the contracts of that period with finished equipments imported from their Head Offices, which have resulted in a massive importation. Directs importations made by the operative companies of the National System of Telecommunications aggravate more this situation turning it to a critical point in the comercial balance, consequences of the petroleum crisis.

This situation lasted until 1975, when the Government started to take several measures to equilibrate the national balance of payments with direct consequences on the sector. The items that have affected the performance of the Telecommunications Sector, as follows:

- Restriction to importations;
- Previous Deposit Refundable;
- Decrease in the orders;
- Urgent need for nationalization.

Since 1976 all manufacturers of this sector created groups of nationalization who work coordinated by the Executive Group for Components and Raw Materials (GEICOM), in the nationalization of their products.

The Governmental directions mentioned before, as well as the the performance of the groups of nationalization, have continued without change until the present day and the total results reached can be evaluated by the series of charts and graphs presented to you, along this work.

Some noticeable economical results reached by the Telecommunications Sector were:

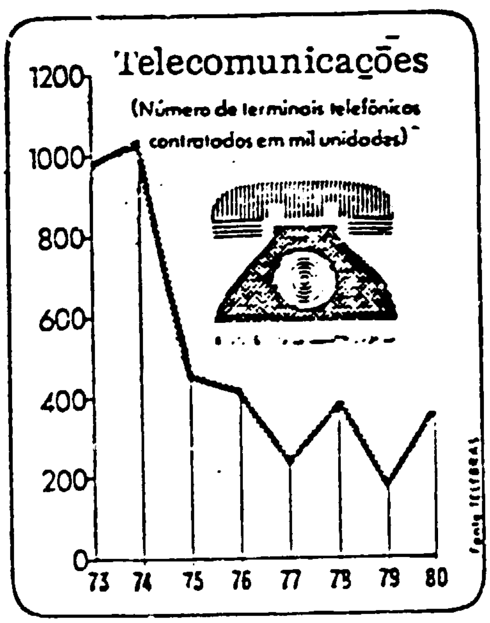
- Commercial Balance with the foreign countries: reduced from a debit of 350,0 million dollars in 1975 to 80 million dollars in 1979.

- Reduction in importations of the industrial sector of Telecommunication, from 250 million dollars in 1975 to 71 million dollars in 1979, or better, a reduction of 350% in the importation for a decline in the invoice bills of about 40%.

- The average value of the imported materials for the production of equipments fell down substantially. Thus, for example, for the manufacture of a switching terminal in 1976, it was necessary to import materials in the value between 120 and 200 dollars. In 1979 this value decreased to an average of 19,0 dollars.

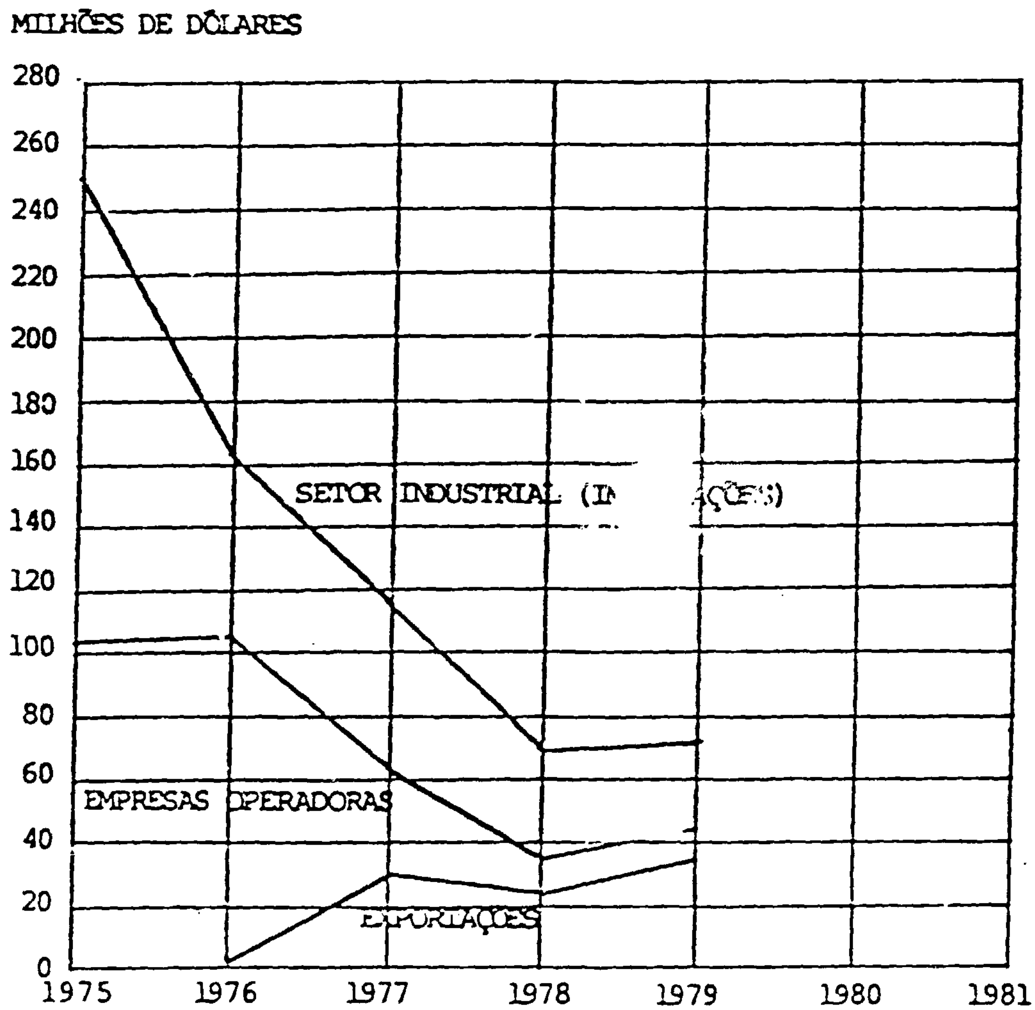
EVOLUÇÃO DA TELEFONIA

	72	73	74	75	76	77	78	79
MILHÕES DE TELEFONES INSTALADOS	2,38	2,42	2,92	3,37	4,04	4,84	5,55	6,46
TELEFONES POR 100 HABITANTES	2,4	2,3	2,7	3,0	3,5	4,1	4,9	5,4



SETOR DE TELECOMUNICAÇÕES

IMPORTAÇÕES X EXPORTAÇÕES



* 30 empresas industriais
* Todas as empresas operadoras

GRAU DE OCIOSIDADE DAS EMPRESAS FABRIS DO SETOR DE TELECOMUNICAÇÕES

EQUIPAMENTO	CAPACIDADE DE PRODUÇÃO	PRODUÇÃO (1979)
Equipamento Comutação Terminais/Ano	1.070.000	500.000
Equipamento Multiplex FDM - Canal Ponta	86.000	34.500
Equipamento Multiplex PCM - Canal Ponta	75.000	38.600
Equipamento Rádio SHF - Transceptores	1.190	536
Equipamento Rádio UHF/VHF Mono e Multicanal - Transceptores	25.480	14.410
Telefones - Aparelhos	1.620.000	845.000
Telefones Públicos - Aparelhos	24.000	8.500
Carrier de Assinantes de Circuitos	53.000	23.000

CUSTO MÉDIO PONDERADO DAS IMPORTAÇÕES, NECESSÁRIAS À FABRICAÇÃO LOCAL DE EQUIPAMENTOS DE TELECOMUNICAÇÕES

VALORES EM DÓLARES

IMPORTAÇÕES NECESSÁRIAS / ANO	1979	1980(*)
Centrais de Comutação Eletromecânica (terminal)	19,29	14,8
Multiplex FDM (Por terminal ponta)	118,9	112,0
Multiplex PCM (Por terminal ponta)	48,1	47
Rádio Microondas (Por transceptor)	7.391	6.000
Rádio Digital (Por transceptor)	7.600	7.140
Rádio UHF (Por transceptor) - 24/60 canais	1.811	1.800
Rádio VHF/UHF (Por transceptor) - mono canal	170	130
Aparelho Telefônico	0,6	0,4

(*) Avaliação do GEICOM em agosto de 1980.

BALANÇO COMERCIAL DO SETOR DE

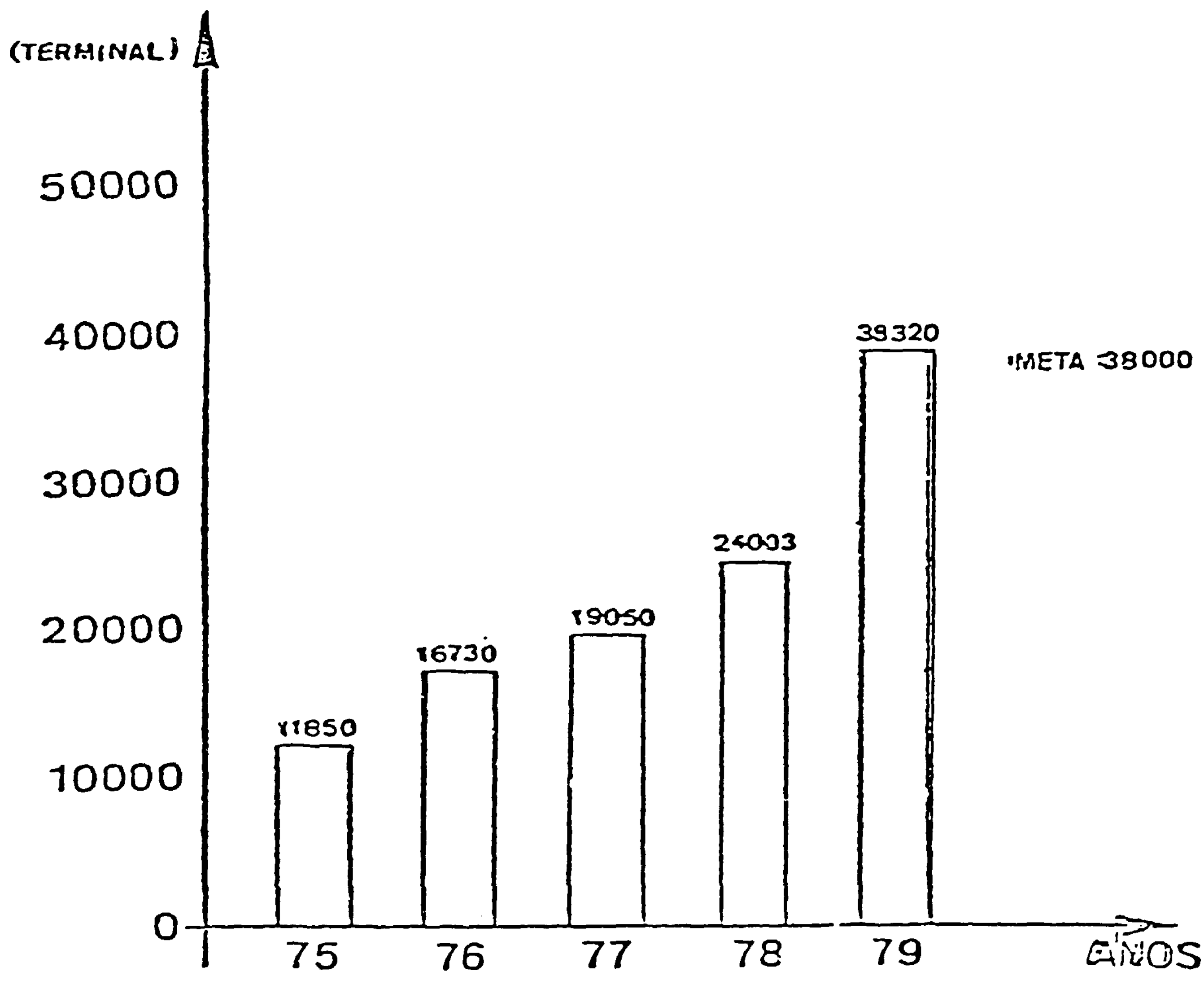
TELECOMUNICAÇÕES

VALORES EM MILHÕES DE DÓLARES

		1975	1976	1977	1978	1979
IMPORTAÇÕES	Empresas Operadoras	102,5	104	63,8	35	43,0
	Empresas Industriais	249	161	117,6	69,1	71,2
	TOTAL	351,5	265	181,4	1041	114,2
EXPORTAÇÕES		-	1,5	30,7	24,4	34,7
BALANÇO COMERCIAL		351,5	254,5	150,4	79,7	79,5

* Inclui 30 empresas industriais e todas empresas operadoras.

TERMINAIS TELEX INSTALADOS
(ACUMULADO)



THE INDUSTRIAL BRANCH OF RADIODIFFUSION

In Brazil we have in commertial operation:

- 118 television station
- 1.022 MW Radio station
- 104 TW Radio station
- 39 SW Radio station
- 280 MF Radio station

Exist in Brazil:

- 125 million inhabitants
- 22 million houses
- 18 million of TV set's 25% is color TV set
- 56 million Radio Set

After a long time decreasing which corresponded exactly with the expansion of the production of good for the Telecommunications sector, the industrial branch of Radiodiffusion being this market reactivated due to the demand originated from the Radiodifussion plans emitted by the Ministry of Communications.

Timidly reappearing about three years ago those industries are already producing:

- MA - MW up to 50 Kw transmitters
- MF stêreo up to 5 Kw transmitters
- TV in VHF transmitters and UHF transmitters and retransmitters
- Equipments for transmiter - studio link
- Tables for audio programmation recording and distribuition

This year we will have local production of equipments for color TV studies such as video cassete, coloured TV cameras, monitors, etc.

The importations of this branch will reach this year 20 million dollars to a total market of about 40 million dollar/year.

EMISSORAS DE RADIODIFUSÃO — 1980

THE INDUSTRIAL BRANCH OF RADIODIFUSION

CONTROLE	OM	OT	OC	FM	TV
EMISSORAS PRIVADAS	1006	97	34	272	106
GOVERNO FEDERAL	16	7	5	8	12
TOTAL	1022	104	39	280	118

THE DEMAND FOR COMPONENTS IN BRAZIL

- The Sector for consumption of equipments

In developed countries, one of the most responsible areas for the demand of components is the professional sector. And thus, in the United States is the war industry and the space program. The other electronic areas receive as a surplus the technological benefits developed specifically for these two sectors.

In Brazil this does not occur; communications, fundamentally characterized by the industrial sector of radio and TV, are mainly responsible for the demand of electronic components. This demand arises from the great national production of these equipments.

To expect such volume of production, besides the local manufacture of parts, pieces and components it is necessary to spend a considerable portion of exchange values in the importation of these items.

- Brazilian Middle-South Industries

In the Middle-South region it is placed the greater power of our electronic industry specially professional components and electronic material.

This industry, was marked till some time ago by a product of less technological development and great rate of nation alization, with no condition to make competition with advantages, in the exportation market or with the products originating from the Tax Free Zone of Manaus, in the domestic market.

TAX FREE ZONE OF MANAUS

Manaus did not have an industrial substructure, therefore it started its industrialization process as an assembling center. The small risk inherent from this kind of industry, and the amount of local incentives, obtained success attracting a great number of new enterprizes linked to strong groups from foreign countries, due to facilities in importation. As the products being of the greatest technological actuality, they had at once the whole preference of the national market, and did not have it completely achiev-ed because its production did not follow the demand.

Evidently, the industries of Middle South suffered consequences of this competition which was considered predatory; the only solution found to fight against this competition was to transfer to the Tax Free Zone of Manaus and also use all their legal facilities.

The situation became difficult for the producers of components and suppliers of manufacturers in the Middle-South region because they could not dispute in Manaus with the imported components, at low cost, more advanced designs and of better quality, and it was there that the great industry generating the demand was inclined to concentrate.

The determination by SUFRAMA in March 1976 to establish minimum indexes of nationalization, was of vital importance in this process, bacause it originated an almost extraordinary increase in demand of components, materials and parts. This demand met the industries of the South not prepared for an immediate compliance, but developed the possibility of growth of the components sector, since the telecommunications sector, the greater professional market was standstill.

The determination of these minimum rates brought the following advantages:

- Garantee of the market for the national industry of components.
- Reduction of importations.
- The industry of components started to produce more advanced components, capable of being used in the professional sector.
- The companies increased their technological knowledge, enabling the development of national industrial groups capable of entering the professional sector.

- . -

BRASIL

PRODUÇÃO DE APARELHOS ELETRÔNICOS

PARA O MERCADO INTERNO

1977/1983

X 10^3 unidades

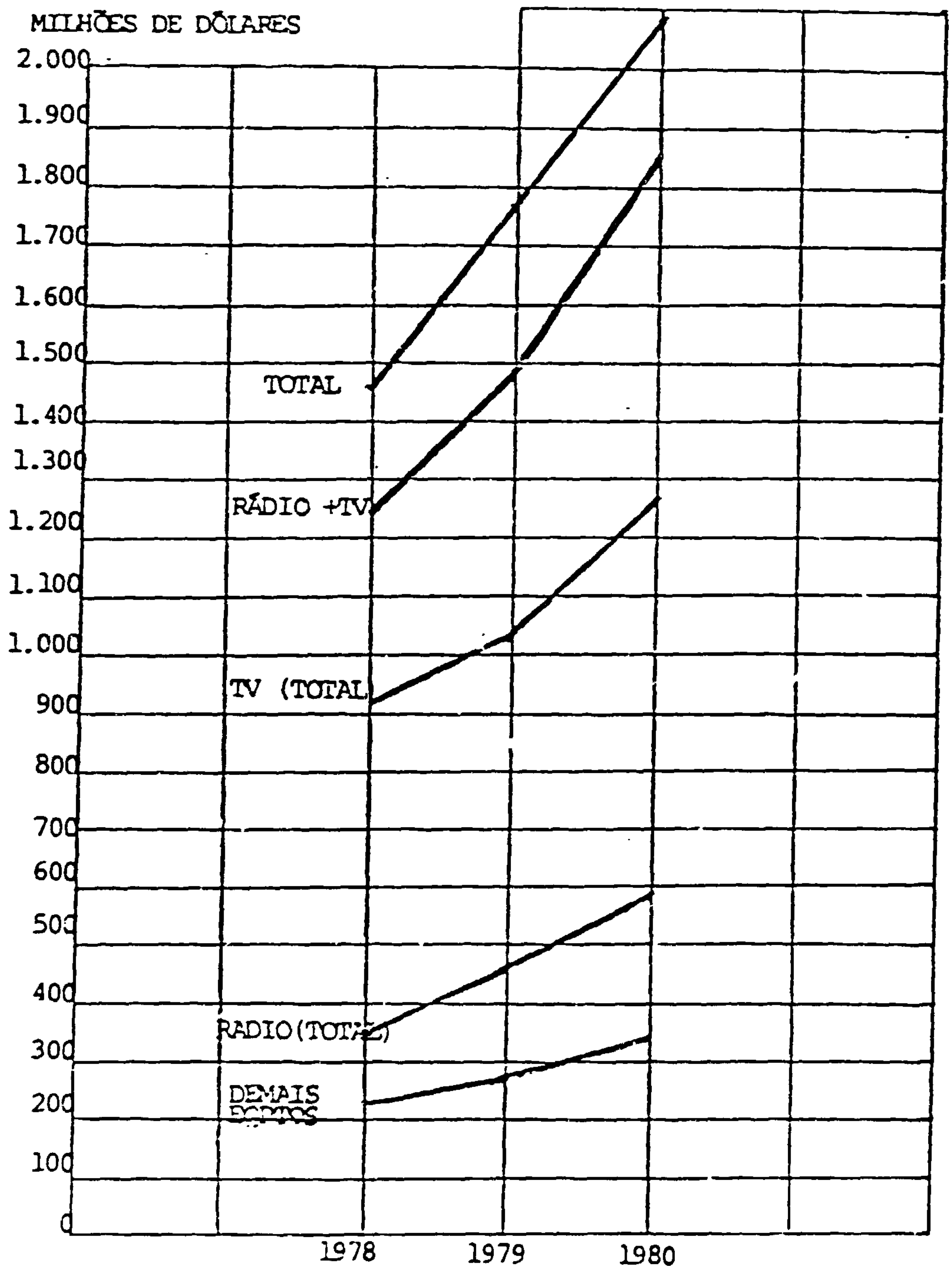
APARELHOS	1977	1978	1979	* 1980	* 1981	* 1982	* 1983
AUTO-RÁDIO	711	879	1.064	1.100	1.150	1.250	1.350
FONÓGRAFOS E RADIO FONOGRAFOS	972	1.220	1.263	1.500	1.800	2.100	2.500
RÁDIOS PORTÁTEIS	2.921	3.565	4.205	4.800	5.500	6.300	7.200
TELEVISORES PRETO E BRANCO	1.294	1.347	1.591	1.650	1.650	1.600	1.600
TELEVISORES A CORES	766	958	1.074	1.400	1.550	1.650	1.800

* Previsão do GEICOM

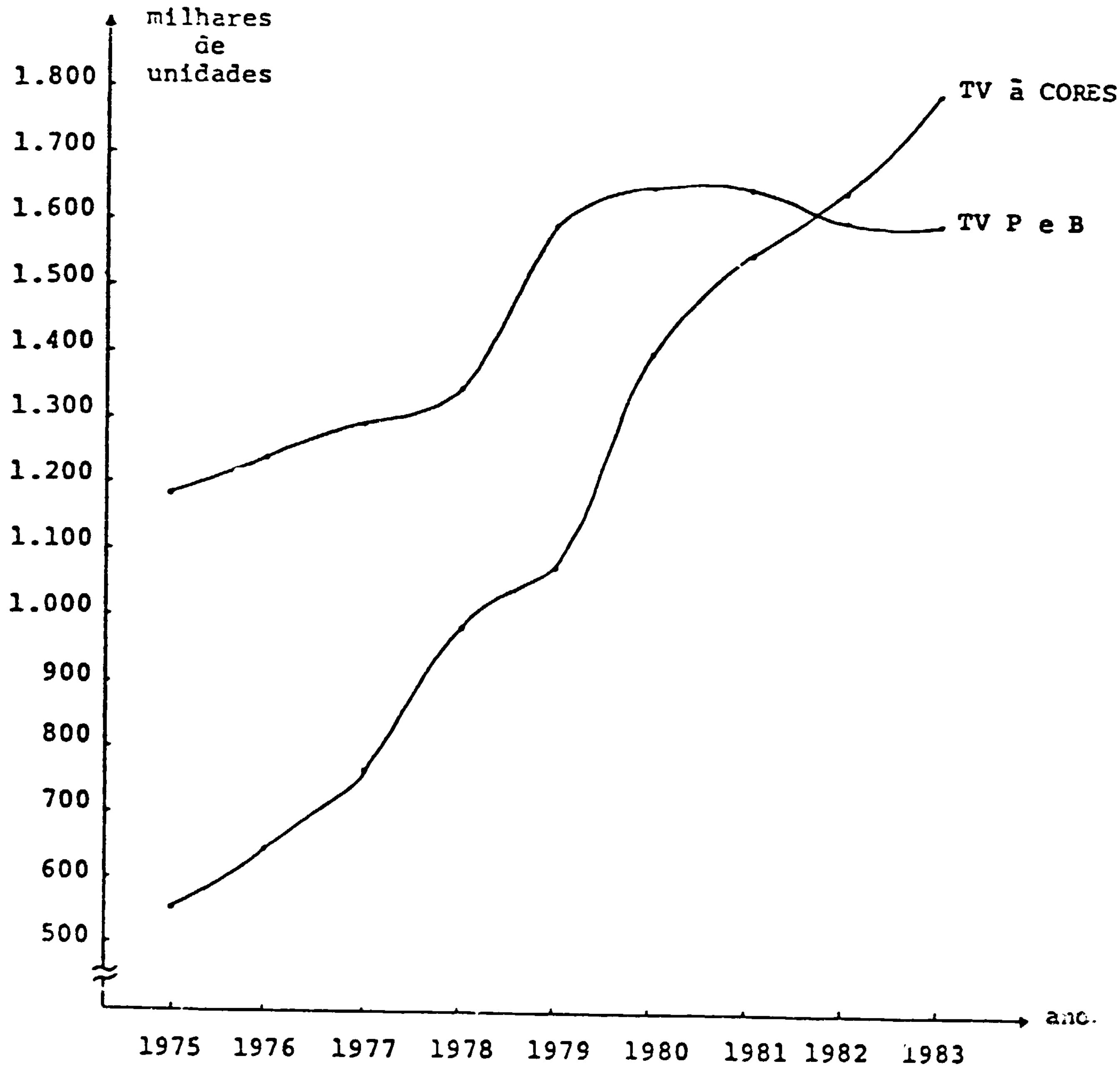
AGOSTO DE 1980

MERCADO BRASILEIRO

EQUIPAMENTOS DE ENTRETENIMENTO



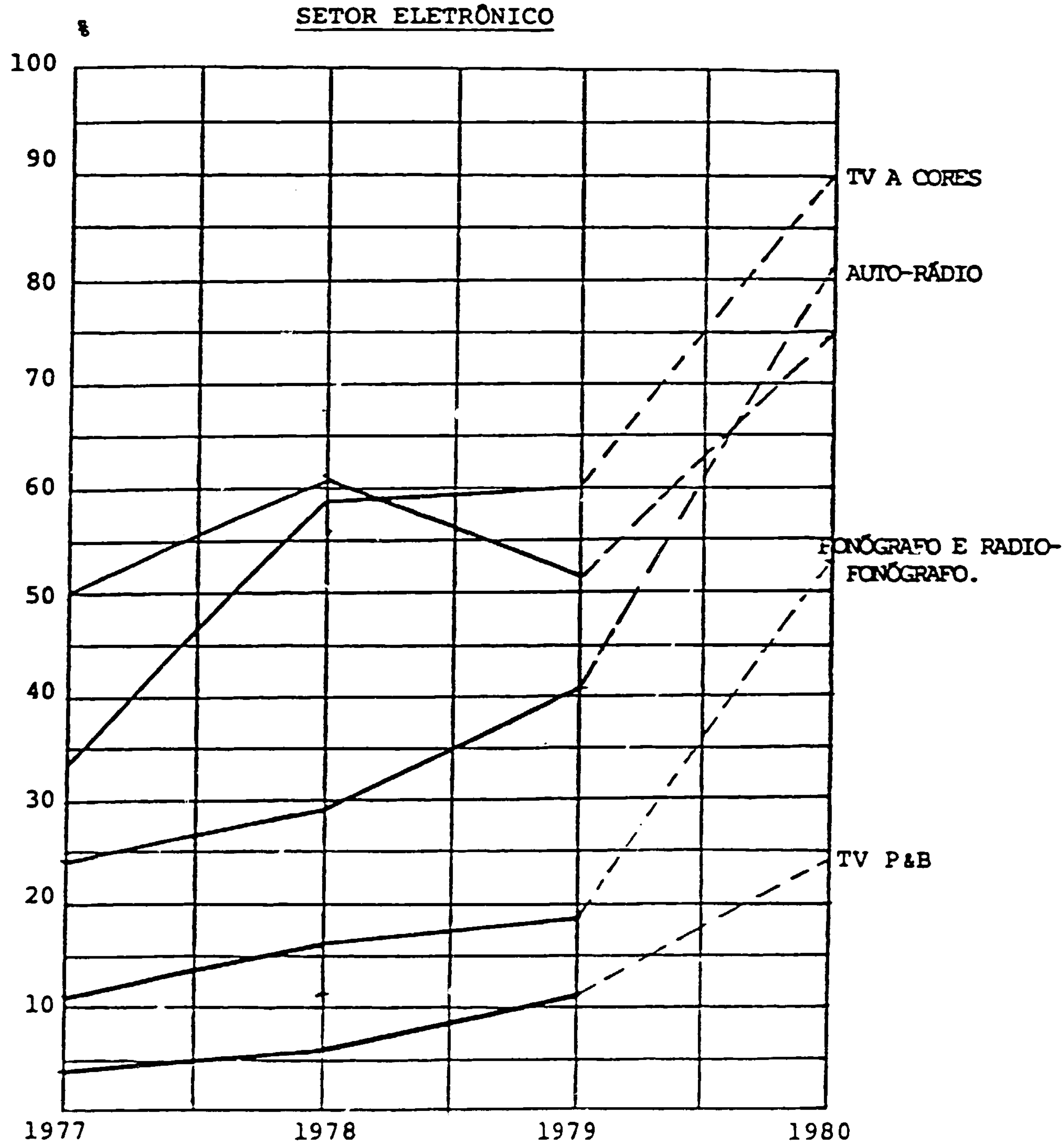
FABRICAÇÃO DE TV NO BRASIL



ZONA FRANCA DE MANAUS

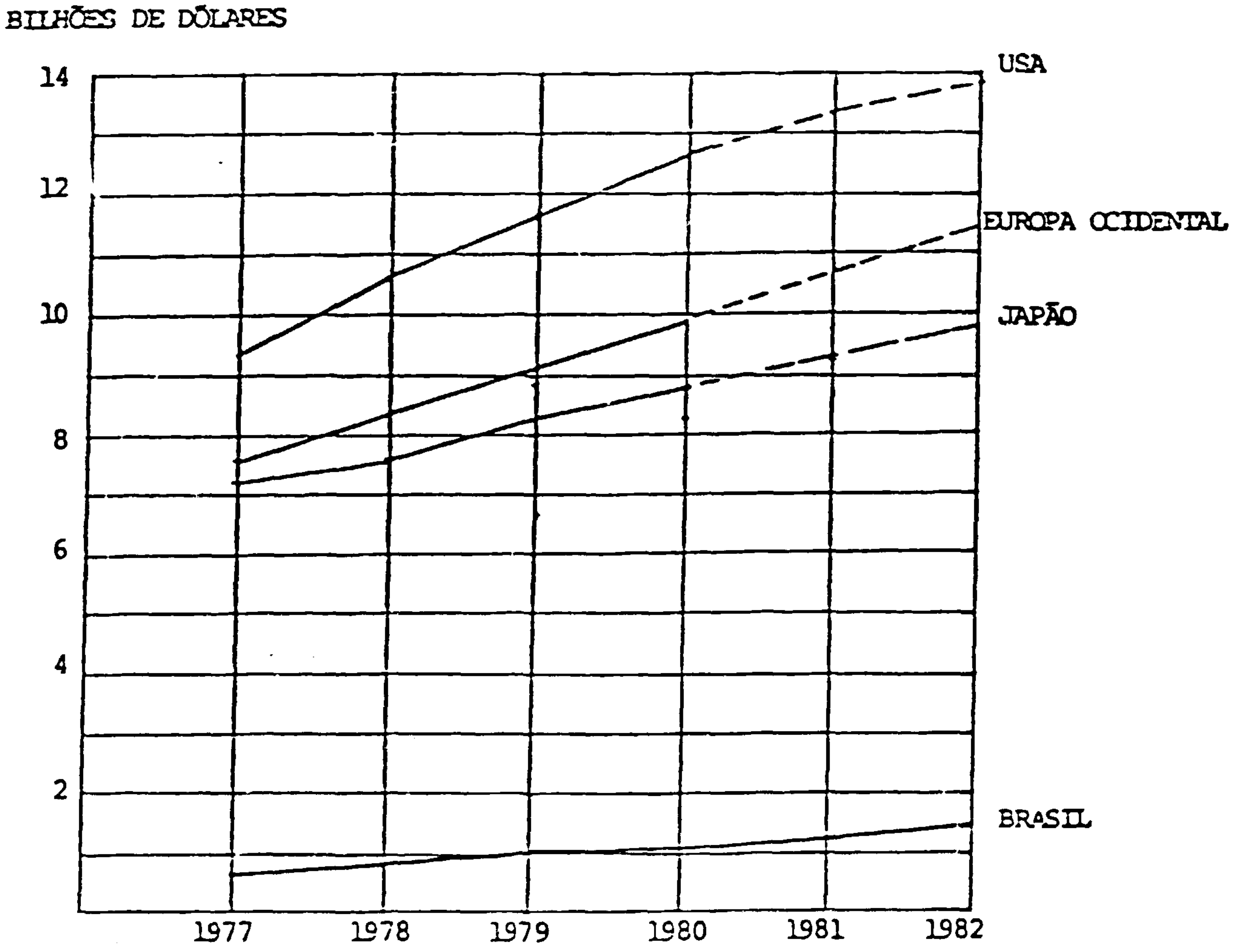
PARTICIPAÇÃO NA PRODUÇÃO NACIONAL

SETOR ELETRÔNICO



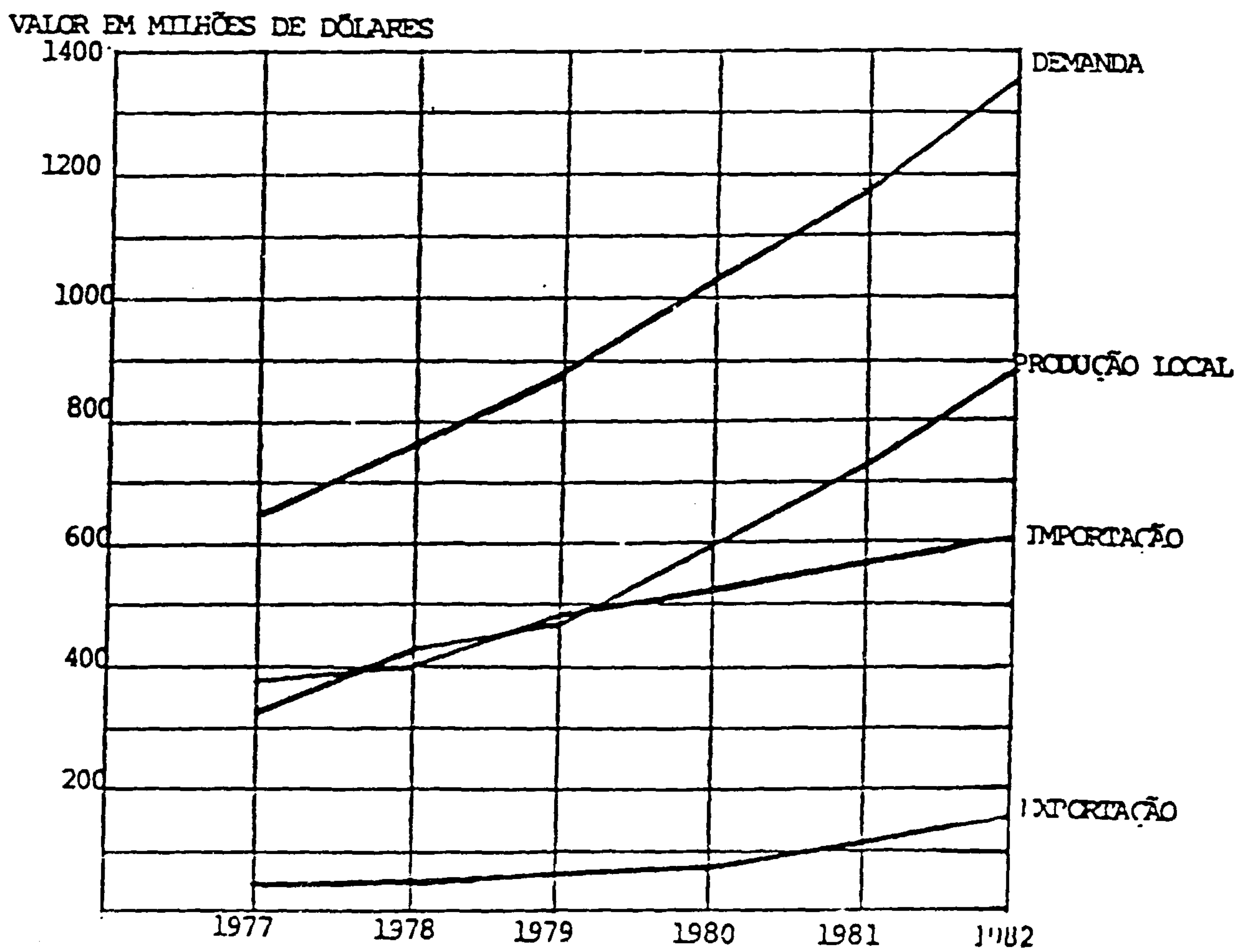
MERCADO MUNDIAL

TOTAL DE COMPONENTES ELETRÔNICOS ATIVOS, PASSIVOS E ELETROMECÂNICOS



MERCADO NACIONAL DE COMPONENTES ELETRÔNICOS

ATIVOS + PASSIVOS + ELETROMECÂNICOS



MERCADO NACIONAL DE COMPONENTES ELETRÔNICOS

ATIVOS + PASSIVOS + ELETROMECÂNICOS

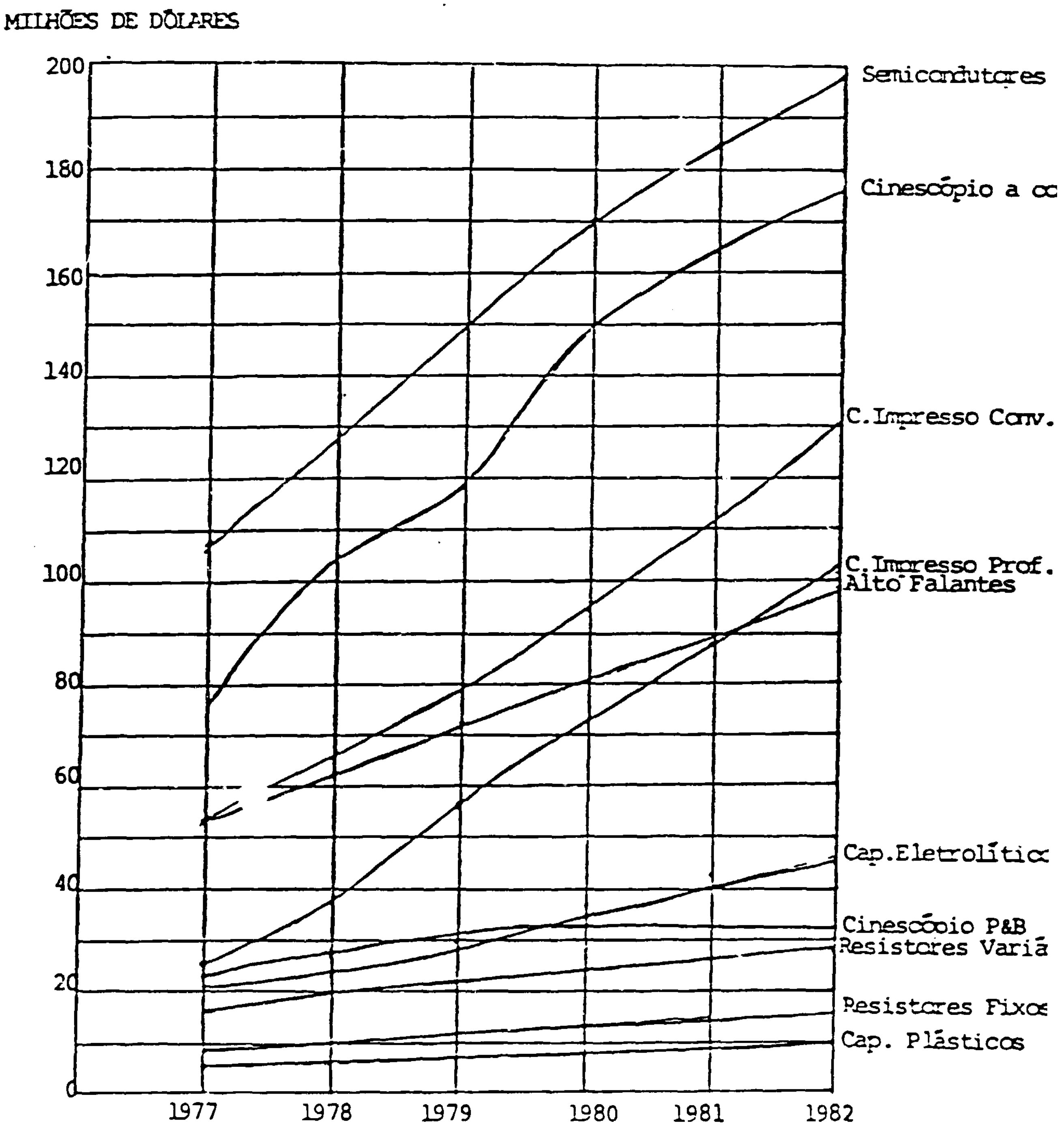
EM MILHÕES DE DÓLARES

	1977	1978	1979	1980	1981	1982
DEMANDA	655	770	890	1035	1180	1350
PRODUÇÃO LOCAL	320	420	470	600	730	890
IMPORTAÇÃO	380	400	480	510	560	600
EXPORTAÇÃO	45	50	60	75	110	140

Avaliação do GEICOM - Agosto de 1980.

MERCADO BRASILEIRO

COMPONENTES ELETRÔNICOS



MERCADO ESPECÍFICO BRASILEIRO
DE
COMPONENTES ELETRÔNICOS

MILHÕES DE UNIDADES

	1977	1978	1979	1980	1981	1982	OBS.
Cinescópio a cores	0,77	1,05	1,15	1,5	1,65	1,75	US$100/U
Resistores Fixos	900	1100	1120	1175	1230	1300	US$0,01/U
Resistores Variáveis	67	82	86	99	105	115	US$0,25/U
Capacitores Cerâmicos	360	410	450	510	560	610	US$0,02/U
Capacitores Plásticos	205	235	250	275	300	330	US$0,03/U
Capacitores Eletrolíticos	195	230	255	300	350	380	US$0,115/U
Cinescópio P & B	1,27	1,45	1,67	1,74	1,74	1,7	US$ 18/U
Alto Falantes	14	16	18	20,3	22,5	25	US$3,95/U
Semicondutores discretos	390	428	470	506	551	600	
Semicond. Interados	18	25,5	30,8	36,3	39,8	43,1	
Circuito Imp.Profissional	25	37	58	78	98	110	Em 1000m²
Circuito Imp.Convencional	430	640	760	950	1100	1300	Em1000m²
Relés miniatura	2,9	3,3	3,6	4	4,4	4,9	US$6,70/U