A BRIEF HISTORY OF KINESCOPE-MAKING IN BRAZIL

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For purposes of historical reference, television was introduced in Brazil on September 18, 1950, with the inauguration of “TV-Tupy”, call PRF-3, which was owned and operated by Brazil's largest radio network, Emissoras Associadas, using RCA equipment with the U. S. television standards of 525 lines, 60 fields, and assigned as Channel 3.

The PRF-3 three-bay super-turnstyle antenna was installed atop the State Bank Building, the highest edifice in São Paulo city, in the early Fifties.

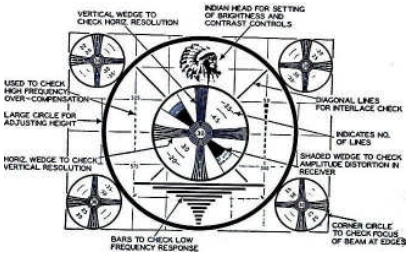
Dr. Francisco de Assis Chateaubriand Bandeira de Mello, Director General of Emissoras Associadas, presenting the RCA equipment used at PRF-3.

The investment and installation of the RCA equipment were the responsibility of Dr. Francisco de Assis Chateaubriand Bandeira de Mello, Director General of Emissoras Associadas through RCA Victor Radio S/A, the RCA subsidiary in Brazil. The new medium was received enthusiastically by São Paulo residents, and soon the TV station started operation on a four-hour daily schedule. Before each "broadcast day," the station sent a test pattern, originally developed by RCA, to let set owners to adjust their receiver controls for best reception. Telecaster soon developed their own test patterns to meet local technical and marketing requirements.

ORIGIN OF PRF-3 TEST PATTERN

In the early days of B&W television, every station, prior to the scheduled programming, sent a test pattern to let set owners adjust their receiver controls for optimum reception. It had been developed originally by RCA in 1939, assuming many forms, among them the American "Indian head." The test pattern was produced by the “Monoscope” tube, type 2F21, from a plate built into it. With the station sending the test pattern, the “Monoscope” supplies the complete signal in place of the “Iconoscope” or camera tube. With the aid of the patterns the TV serviceman could check and adjust several parameters concerning a television receiver - linearity, bandwidth, etc..

Such a pattern was used by many television stations all over the world, as well the “TV Tupy” network in Brazil.

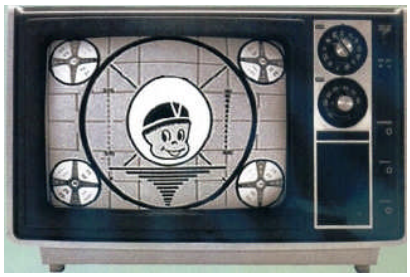


Test pattern developed by RCA in 1939, showing several image elements for adjusting receiver controls.

RCA 2F21 monoscope,
part of TK-1A system.

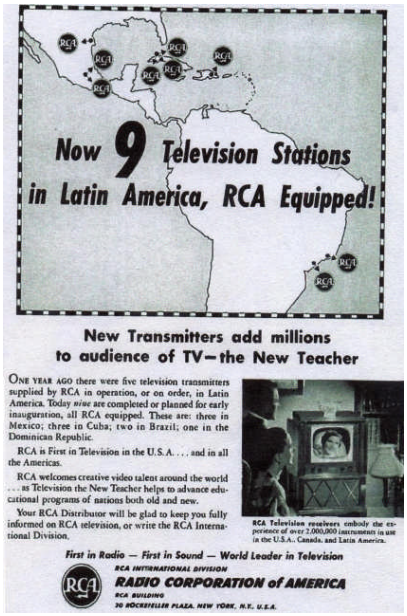
Considering that the "PRF-3" pattern was kept on the air for many hours, it led to a boring situation for the tele-spectator. To reduce this annoyance, the cartoonist in charge of "PRF-3" station vignette production, Mario Fanucchi, created an alternative to the stern-faced American Indian through a stylized, more likable national counterpart, soon christened as little Indian – "Tupiniquim."

The new cartoon in childlike style displayed its feather with antennas arising a more pleasant look mainly for the young audience besides giving a new marketing identity to the station, already known as responsible for bringing TV technology to Brazil.



Test pattern as customized by PRF-3,
displaying the Indian "Tupiniquim."

Brazil was the first country in South America and the fourth in the world community to have a television station with daily broadcasts. An RCA ad in its magazine *Broadcast News*, circa 1952, shows the growth of television stations in Latin America. In just one year the number jumped from 5 to 9 TV transmitters all of them RCA-equipped; among them two located in São Paulo and Rio de Janeiro, Brazil. *[RCA was not alone in the Latin American TV market. The Feb. 1951 issue of the* Du Mont Raster *celebrated the outfitting of CMQ-TV in Havana, and a second station there, with camera chains and other gear. The Dec. 1951 issue reported the sale of "Telecruiser" remote-pickup buses to a station in São Paulo and to TV Belgrano in Buenos Aires. - Ed]*

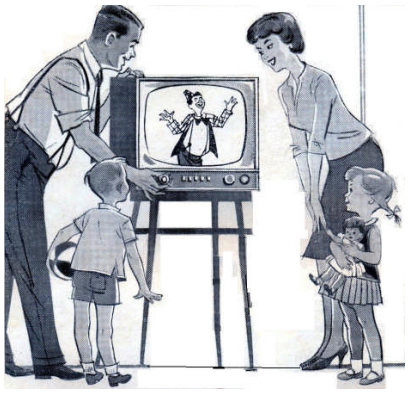


RCA "Latin America" ad

In early Fifties, Brazilian television was still a formative activity, considering the lack of technicians trained in this new media technology as well as on the artistic side. Telecasting was still live-broadcast.

Since at the beginning of television the transmitting and receiving equipment were still imported, consequently increasing the receiver costs and certainly restricting the purchase to few ones only.

Therefore even considering those handicaps around mid-Fifties television entered in the Brazilian homes pressing the industry to launch in the market the first local produced television receivers, figuring circa 305,000 units sold in 1963.



Television enters Brazilian homes in the mid-'50s. despite technical and economic handicaps.

A WORD ON TRADE-MARKS AND TECHNICAL LEXICON

At the beginning of the electronic age, the perennial force of competition pressed inventors and innovators in the role of patents and monopoly, as happened in the transition from the mechanical to electronic television technology. The original exploration of the field of television took place in Europe. However, American inventors were primarily responsible for translating this early work into commercial electronic TV through the development of the "electronic eye" or camera tube and the electronic scanning device or picture tube, both deriving from Dr. Zworykin's researches at RCA Laboratories. *[Television historians also recognize the role of the inventor Philo Farnsworth, plus developers in Britain, France, and Germany - Ed.]*

Reception honoring a pioneer of electronic television. The photo shows members of "TELECOM" – Brazilian Electronic Industry Association: from left to right, Dr. Antonio Portella Neto; Captain-engineer Chaves Lameirão; Dr. Vladimir K. Zworykin, the father of the iconocope and kinescope; General Amaro Bittencourt; Gilberto Afonso Penna, manager of *Antenna*; Perry F. Hadlock, president of RCA-Brazil and, in the right corner, Dr. Jose Barros Santos, founder of "SNE" – Sociedade Nacional de Eletrônica responsible for making communication equipment under RCA license. In the visit to Brazil in November 1950 under the auspices of the University of São Paulo and sponsored by "TELECOM," Dr. Zworykin lectured on the state-of-the-art inTV technology by commenting on the latest innovations and trends, such as the image orticon, vidicon", new kinds of TV cameras, industrial and color television, and so forth.

Considering the state-of-mind protection mood on inventions and innovation in electronics at the time, certainly such so relevant researching work led RCA to file applications for the trademarks: "Iconoscope" and "Kinescope" as registered names for the camera tube and the picture tube respectively.

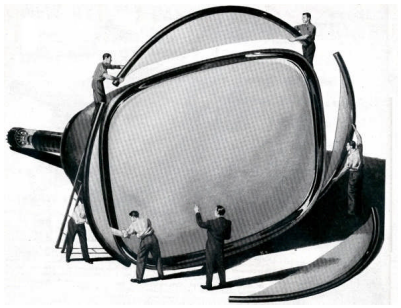
Since the picture tube was made and sold in Brazil as "Cinescópio," the Portuguese lexicon for the original trademark term, it has been kept as a matter of historical terminology only, bearing in mind that around 1950 RCA surrendered rights to several of its registered product names.

> Three of television best known trademarks and famous miniature tube is being voluntarily surrendered to the public domain by Radio Corporation of America, Frank M. Folson, President, announced on August 17.
>
> Mr. Folsom said that the U.S. Patent Office has been requested by RCA to cancel its registration of these registered Trade Names: Iconoscope, first electronic "eye" of the television camera; Kinescope, picture tube of television home receivers; Orthicon, improv-

ed television pick-up tube; and Acorn, tiny radio now a common place in portable sets *[sic].*

"Now that television has become established, "Mr. Folsom declared, RCA finds gratification in the fact that industry uses these names in a generic and descriptive manner. In relinquishing our registrations of the benefits of the industry, we are following RCA, tradition policy of stimulating progress in radio and electronic fields." The three television trade-marks are of Greek derivation. "Kinescope," registered by "RCA" in 1932, stems from "kineo," meaning "to move," and "scope" signifying "observation." "Iconoscope," registered in 1935, incorporates the Greek "icon," meaning "image": "Orthicon," registered in 1940, derives from "direct".

In Brazil, the term "kinescope" was translated as: "Cinescópio," as cited in a local RCA advertisment. Conventional style and new style kinescopes at left and right respectively.



Celebration of the conversion to rectangular CRTs

Trademarks, tradenames, coined technical terms, patents numbering are issues of great importance in the history of technology. The excerpt from "RCA" above was collected from the RCA magazine *Radio Age*, October, 1950, page 21. In Brazil, the term "Kinescope" was translated as "Cinescópio."

KINESCOPE-MAKING IN BRAZIL

Standard Electrica S/A – SESA – the Brazilian industrial branch of the ITT group in the USA, started making tubes in the early Forties. However, it reached a high production level only in 1956, through investments made by Philips and RCA, which consequently led to the origin of the locally made kinescope. Philips, through its subsidiary IBRAPE – "Indústria Brasileira de Produtos Eletrônicos" and RCA, originally in the Company's facilities in São Paulo circa 1956, moving later to Belo Horizonte in a new factory already prepared for transistor-making.

CINESCOPIOS E TRANSISTORES

A uma pregunta que fizemos sobre a producão de cinescópios, esclarce o presidente da RCA.

- A fabricão de cinescópios pam TV foi considerada de primordial importancia pela nossa organizacão. Tanto assim que a RCA Victor passará a produzir cinescópios muito antes de estar em funcionamento a fábrica de Belo Horizonte. Logo nos primeiros meses do ano proxima vindouro, comecaremos a produzir cinescópios na fabrica que esta sendo instalada em São Paulo. Talvez os senhores estranhem essa duplicidade de locais, mas devo esclarecer que esta rigorosamente de acordo com os preceitos de engenharia industrial estabelecidos pela longa experencia da RCA neste assunto: evitar a concentracao de suas fabricas em um unico local. A instalacao da fabrica de cinescópios em São Paulo e indicada pelo fato de se tartar de produto volumoso e de transporte delicado; nada mais logico, portanto, do que produzi-lono local em que devera ser entregue aos seus majores consumidores - isto e, onde estao as principais fabricas brasilieras de televisores. A fabrica de cinescópios esta na sua fase final de instalacao, e desde ja convido "Antenna" a fazer uma reportagem sobre esta outra importante inicativa industrial da RCA Victor.

- Voltando ao assunto de nossa fabricca de Belo Horizonte (prossegue o Sr. Hadlock), ha uma informacao de grande interesse: esta tambem prevista a fabricao de transistores.

"Kinescopes and transistors"

In 1955, Perry F. Hadlock, president of RCA-Brazil, in an interview with the magazine *Antenna*, confirmed the company's plans for local production of kinescopes, and later on transistors. Picture tubes would first be made at RCA facilities in São Paulo, as the majority of TV setmakers were located in such an industrial area. Later on, valves, kinescopes, as well as transistors would be made in the new plant in Belo Horizonte, in the state of Minas Gerais. Excerpt of Mr. Hadlock's interview collected from *Antenna*, November 1955.

RCA plant on Avenida David Sarnoff

Homage to General David Sarnoff: On January 21, 1971, the municipality of Contagem city in the neighborhood of Belo Horizonte named a new avenue for the honorable American entrepreneur of the electronic industry. The avenue crossed the front of RCA's new plant devoted to the manufacturing of tubes, CRTs, and transistors. Source: *Antenna*.

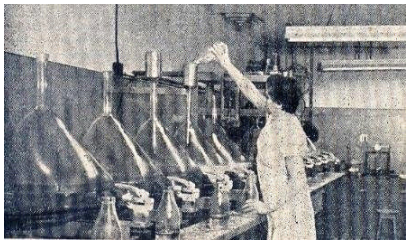
In 1956 RCA was already producing the first batches of kinescopes in São Paulo with a painstaking manufacturing process comprising several sequential stages. They consist of: chemical cleaning of the glass bulb, application of the luminescent phosphor solution to the screen, application of a graphite mixture coating, known as "Aquadag," to give a uniform voltage distribution over the entire bulb, simultaneously degaussing and radio-frequency heating for inner-debris burning, and bulb-sealing.

Then the assembled picture tube was put through quality-control stages involving checking for electrical performance as well as operational conditions regarding the vacuum and luminosity level and finally, the quality of the image projected by the cathode.

KINESCOPE MANUFACTURING STEPS

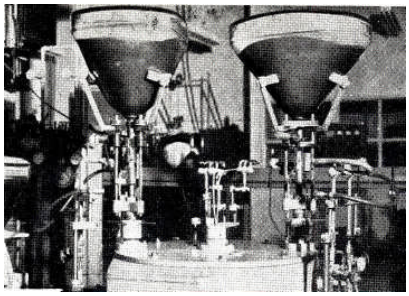
The main stages of tube-making at RCA, for instance, for type 21YP4, are as below.

RCA's large facilities for kinescope-manufacture in São Paulo

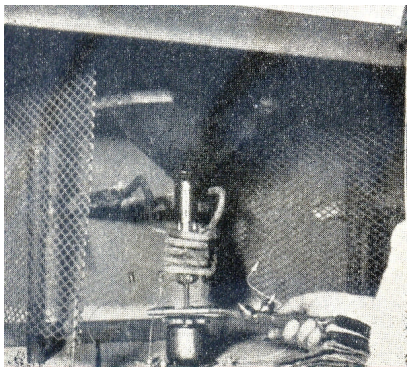


Stage: screen preparation in a room controlled for temperature, humidity, and dust.

Stage: application of Aquadag coating and heating of bulb to 415 ºC.

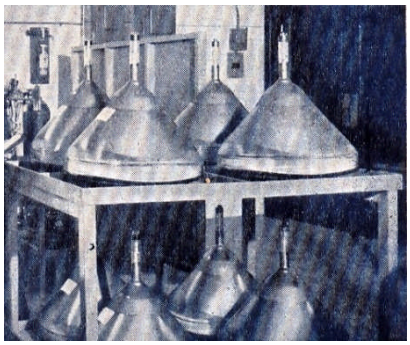


Stage: assembly of inner electrodes of kinescope.



Stage: simultaneous RF heating and removing residual gases from the electron gun

Stage: electrical testing of kinescope.



Final stage: packing and storage.

PRODUCTION OF SETS

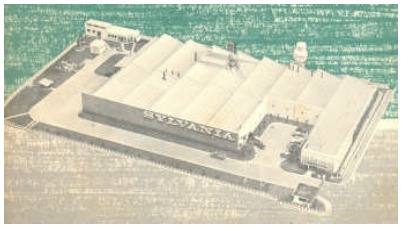
Philips-IBRAPE started local production of thermionic valves by launching in the market the "noval" and miniature types. In 1956 the factory was producing circa 1000 units per hour, which led the company to introduce several types of kinescopes in its product line.

A 23 inch-inch size, 114º-degree deflection angle, and aluminized screen were features of the "SILVERAMA" kinescope series in this ad published by RCA, circa 1960. Source: *Antenna*

Philips-IBRAPE ad outlining the advanced technology and quality control in its products in the early Sixties. Source: *Antenna*

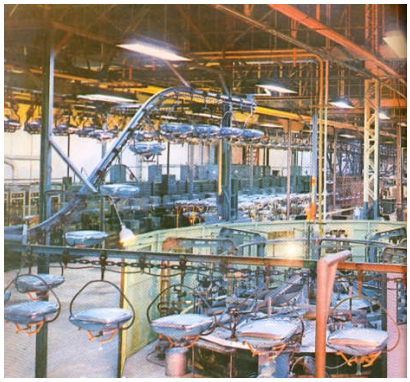
One of the most important factors for the industrial achievement was the local manpower, as a tight rejection rate was imposed on the company's production line, much lower when compared with the ones found in industrialized countries overseas. Considering manpower represented a 70% share in the total manufacturing chain, it contributed by improving product quality as well as minimizing end-user costs.

Sylvania was another U. S. enterprise to make picture tubes in Brazil. Sylvania's activities as maker of kinescopes and sets begun after the bankruptcy of the Brazilian group Empire Radio e Televisão, of which the company was the main creditor.



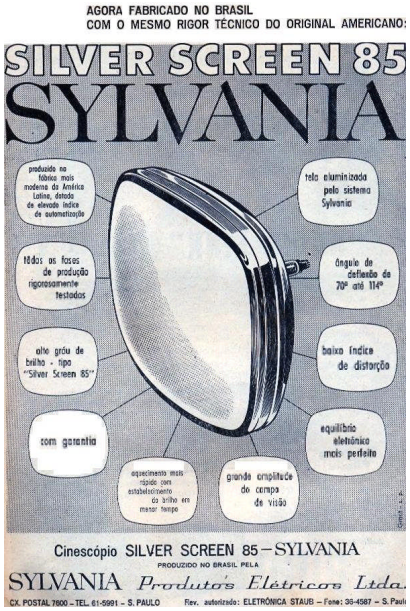
Sylvania facilities in São Paulo continued those of "Empire Radio e Televisão." Source: *Antenna*.

Making CRTs in São Paulo, Sylvania also developed a TV-receiver production line, initially for black-and-white models and later on color ones with high quality.



Sylvania kinescope production line, circa 1961. Source: *Antenna*

In 1964 Sylvania (Silvania Produtos Elétricos Ltda.) reached a cumulative figure of 500,000 kinescopes made in Brazil, sold to independent television makers as well as in the replacement market.



Advertisement for the Sylvania "Silver Screen 85" kinescope series. Source: *Antenna*

The Company commemorated the event through a cocktail party at the Scandinavian Club in São Paulo on February 27. At this event the management released a new marketing approach by sponsoring on São Paulo TV net Channel Two a movie series entitled "Espionage."

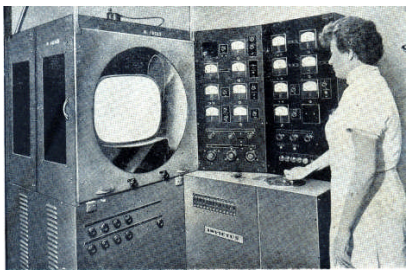
Celebration in 1964, commemorating the production of the 500.000th kinescopes made by Sylvania in São Paulo. Source: *Radiotécnica*

A disastrous fire in the company's plant pressed it to stop the TV receiver production. Therefore, Sylvania stayed in the market for a while as a kinescope-maker only. In the later Sixties Sylvania ceased its industrial operation in Brazil, transferring its original installations to Philco Radio e Televisão Ltda.

As it has been known, components were the Achilles' heel of the local electronic industry. Over the years many parts were imported, mainly transmitting and receiving valves considered, in the early Fifties, the backbone of industrial and scientific applications.

Bearing in mind those technical and historical aspects the national kinescope-making was quite peculiar as independently of big foreign investment in the country from either American or European sides, for local similar component making, originally a Brazilian enterprise was competing in the market, since "Invictus S/A Radio e Televisão" was credited with launching the original national counterpart for the industrial electronic community.

The Company was founded in 1934, originally making radio receivers. In the television boom of the mid-Fifties, Invictus expanded its industrial activities as the first national brand of kinescope. The company started production in its old plant and later on planned to move to its new facilities located downtown in São Paulo city, scheduled for December 1964.



Evaluating kinescope performance in Invictus' quality control department.
Source: *Radiotécnica*

The production process was like the one mentioned above, i. e., bulb-cleaning, inner-electrode assembling, bulb-preparation, and finally electrical and operation performance testing.

In a short period of time, circa 10 years, after the inauguration of the first Brazilian TV station, a national enterprise, facing the lack of industrial infrastructure, Invictus' efforts culminated in advanced kinescope-making by using the new 110º deflection geometry, an innovation for the national industry as Brazil was the second country in the world to use such technology, and in this way improving the production of TV sets.

. In the new 21-inch 110-degree deflection geometry, the kinescope bulb was much shorter than the older 70º and 90º types. Considering the smaller bulb neck diameter, it allowed the fitting of high-sensitivity deflection coils. The electron beam scanned the screen in a wider angle with power not higher than with the 90º counterpart.

The improved low-voltage electrostatic-focused electron gun assured image sharpness all over the screen, besides no longer requiring an ion trap.

Certainly the new tube-making technology helped industry in the development of improved receivers in circuit quality, image performance, and compactness.

Picture tubes of the same screen size but different deflection angles

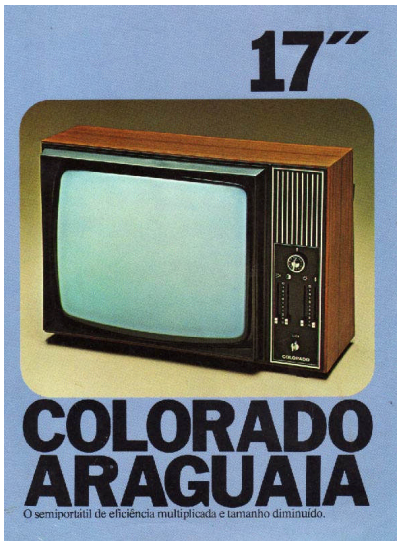
OVERVIEW OF TV SETS MADE IN BRAZIL – 1955-1970

An illustrated overview of television receivers made in Brazil follows. In the mid-Fifties the local industry was already able to supply many kinds of mechanical, electro-mechanical and electrical components including valves, as well as kinescopes in several sizes and deflection geometries.

Black-and-white table TV set, “Predicta” model, made by Philco-Brazil based on the American counterpart, model UG-4242M. Tube circuitry using a 21-inch CRT, circa 1956. Source: Maria de Oliveira collection.

CONCLUSION

The above illustrates several aspects of the origin and evolution of kinescope-making in Brazil. Other topics related to the matter could have been covered, such as the rebuilding of defective picture tubes by small and independent companies, the



Semi-portable color receiver, Araguaia model, solid-state circuitry using 17-inch aluminized 110º kinescope, made by Colorado, an independent television receiver maker, circa 1970. Source: archives of Nilson Bertoni

Color receiver, model TVC 364V, solid-state circuit topology, using “high-light” 14 inch series kinescope, made by Telefunken–Brazil in late Seventies.

industry efforts to overcome the difficulties of local manufacturing, as well as the application of 110º kinescopes, and so forth. However, as the author’s challenge in any publication is space, those themes were left for future opportunity in writing on the history of electronics in Brazil.

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