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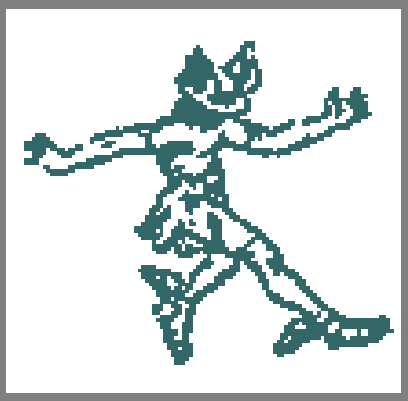

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Radio Habana Cuba Sticker

"The Beginnings of Radio Habana Cuba"

By
José Altshuler
Cuban Society for the History of Science and Technology

The first decade of the 20th century saw the installation and regular operation of the first radio communication stations in Cuba. They utilized De Forest and Telefunken low- and medium-frequency spark transmitters to provide wireless telegraphy services, essentially ship-shore. By 1916, in reaction to the ongoing World War, the Cuban government equipped its station at the entrance of the bay of Havana with a 20 kW transmitter, so that it could reach "the United States and [...] any ship 500 miles or more from the island" [1].

Radio broadcasting inaugurated in 1922, initially in an amateurish way, and shortly after with a 500-watt medium-wave transmitter installed and operated in Havana by ITT through its subsidiary, the Cuban Telephone Company. Erected with a view to enhancing the corporate image of ITT, the facility was one of the nine most powerful stations in the Western hemisphere at the time [2]. Commercial broadcasting expanded rapidly from 29 medium-wave stations operating in 1923 to 81 in 1935, when the number of radio receivers in the country was about 45,000 [3].

By the end of 1933, the first shortwave commercial broadcasting station was installed. A few other low-power shortwave transmitters went into regular operation afterwards for the purpose of serving the interior of the country, but they were not effective enough and most of them were put off after some time. Only a few low-power shortwave broadcasting stations remained in operation in Cuba in the 1950s, each one dedicated to the simultaneous transmission of the ordinary commercial programs broadcast by associated medium-wave stations serving a national audience. As for international point-to-point shortwave radio communications services, practically all of them were in the hands of private companies. The most important ones belonged to ITT.

A modest but effective shortwave radio communication network was set up in 1958 between the Cuban guerrillas that fought against the bloody dictatorship in power since 1952 and various radio amateur stations in the country and abroad. The first and most important guerrilla station was Radio Rebelde, at the Sierra Maestra mountains, whose programs greatly influenced the country's public opinion at the time. In a certain way, this announced in more than one sense the radically different development the country's radio communications were to undergo before long [4].

The main avowed purpose of the revolutionary government established in Cuba early in 1959 was to accomplish deep social, economic, and political changes in the country's best interests in general and those of the needy in particular. As the events that followed led to more and more radical measures which affected important corporate interests, both national and transnational, the new administration realized that the country must have—as soon as possible—its own international shortwave radio communication means, including broadcasting. This was seen as an important way to avoid complete informational isolation by powerful unfriendly interests, especially in case of a foreign military attack [5], a point of view akin to the one prevailing at the close of World War I among high ranking government officials in the United States who believed that "foreign ownership of any part of American telecommunications would prove dangerous in any future war" [6].

The Ministry of Communications—its Telecommunications Advisory Council in particular—was responsible for the bulk of the initiatives that brought

[1] Altshuler, "La Telegrafía Sin Hilos en Cuba (1899-1916)," *Llull*, 20,39 (1997): 443-463.
[2] Altshuler, "Cuba: Plataforma de Lanzamiento y Polígono de Pruebas de la ITT," 59-93 in *El Teléfono en Cuba, 1849-1959* (Havana: SCHCT- ETECSA, 2004).
[3] Altshuler, "Cuba," 73-88 in Las Telecomunicaciones en Hispanoamérica, Pasado, Presente y Futuro (Madrid: AHCIET, 1993).
[4] Altshuler and P. Luis Torres, Cuando Nuestras Comunicaciones Asaltaron el Cielo," *Juventud Técnica*, 264 (November 1989): 45-49; and Luis Buch, *Más Allá de los Códigos: Las Comunicaciones en la Guerra de Liberación* (Havana: Ed. Ciencias Sociales, 1995).
[5] Altshuler, "From Shortwave and Scatter to Satellite: Cuba's International Communications," 243-249 in Andrew J. Butrica, ed., *Beyond the Ionosphere: Fifty Years of Satellite Communication*, NASA SP-4217 (Washington: NASA, 1997).
[6] Robert Sobel. *ITT: The Management of Opportunity* (New York: New York Times Book Co., 1982), 34-35.

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into being, in record time, the powerful shortwave transmitting center and associated receiving center required. The following provides a broad outline of how this feat was accomplished, including some of the important changes it prompted in the university teaching of electronics and telecommunications.

Technical support

The revolutionary administration that took charge of the country's Ministry of Communications early in 1959 devoted itself to the task or transforming the huge bureaucratic office at the service of petty politics the ministry used to be into a technically oriented institution worthy of the name.

At the beginning, while essentially preserving the original organization in order to avoid disrupting the ordinary public services then provided, the newly appointed Minister created a Telecommunications Advisory Council, labeled Consejo Asesor de Telecomunicaciones and ordinarily referred to thereafter by its acronym, C.A.T. Staffed mainly by a small number of electrical engineers and technicians, and a larger number of enthusiastic electrical engineering students, its original purpose was to collaborate closely with the Ministry's technical vice minister in drawing up whatever technical proposals were required.

The Telecommunications Advisory Council immediately devoted itself to carrying out several studies with a view to updating the country's notoriously obsolete telegraph system, establishing a national telex system, and building an effective ship-shore radio communications network. However, its first priority was to promote the initiative of setting up two modern and efficient international shortwave radio communications services (point-to-point and broadcasting), whose design and implementation by the Ministry of Communications would be taken care of by its staff until brought to fruition.

To begin with, preliminary calculations were made of the transmitter powers, working frequencies and antennas required to establish reliable radio communications between Cuba and different areas abroad [7]. Also, an azimuthal equidistant map centered in Havana was carefully drawn to help in designing a suitable antenna field [8].

Contacts with appropriate manufacturing firms and evaluation of their eventual proposals were put in the hands of C.A.T. personnel who engaged in technical and other related discussions with various possible suppliers of high repute in their respective fields. Two of them, Telefunken in West Germany and Brown Boveri in Switzerland, claimed they were able to deliver immediately one 100-kW shortwave transmitter. Members of the Cuban delegation to the International Telecommunication Union conference which was then taking place in Geneva were able to personally verify the claim by the Swiss firm. Apparently, the equipment it offered had been specially manufactured for the Ethiopian government, who had backed off its original intention for financial reasons.

On November 10, 1959, the C.A.T. issued the first part of a preliminary report on the installation of a shortwave transmitting station in Havana, which emphasized the urgent need to seize the opportunity and acquire at least one high power transmitter to provide an effective broadcasting service, plus additional equipment to establish reliable point-to-point communications links with Mexico, Venezuela, and other countries, if possible. A proposal was made that the transmitter building and antenna field be erected near the town of Bauta on a plot of land some 25 km distant from the main building of the Ministry of Communications in Havana, which was accessed by fairly good roads and by electric power supply lines from two different substations. It was also claimed that, if powerful enough, the new radio broadcasting service would give the nation the ability not only to spread the achievements and goals of the revolutionary process taking place at home, but also to "rapidly inform listeners abroad, particularly Cuban diplomatic personnel overseas, of any important events that might possibly arise in our country, and be systematically distorted by foreign news agencies [9]." This turned out to be quite accurate, especially during the failed 1961 Bay of Pigs invasion and the 1962 missile crisis.

[7] Consejo Asesor de Telecomunicaciones, *Potencias y Equipos para Circuitos Internacionales* (Havana: C.A.T., Ministerio de Comunicaciones, August 10, 1959); and Consejo Asesor de Telecomunicaciones, *Frecuencias y Antenas para Circuitos Internacionales* (Havana, C.A.T., Ministerio de Comunicaciones, 1959).
[8] R. Nin Mesa, "Un Mapamundi Acimutal-equidistante Cubano," *Ingeniería Eléctrica* 4,1 (January-March 1960): 21-31.
[9] Consejo Asesor de Telecomunicaciones, *Informe Preliminar sobre la Instalación de una Estación Transmisora de Ondas Cortas en La Habana*, Part I (Havana: C.A.T., Ministerio de Comunicaciones, November 10, 1959).

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Parts II [10] and III [11] of the above mentioned report followed quickly, with a proposal for the orientations of eight rhombic antennas for the transmission of radio signals toward various areas of interest, and tentative timetables for overseas broadcasting. Figure 1 shows the azimuths of the rhombic antennas erected [12].

To secure the required government approval and funding, the Minister of Communications took the above proposals to the cabinet, where he had to fight the opposition by some who objected that very few people would take the trouble to listen to shortwave radio broadcasting. But in the end, the merits of the proposals were not only accepted in principle but required to be implemented more fully as well.

As a result, by the end of June 1960, contracts were signed with five well-known European manufacturing firms: Brown, Boveri & Co., N.V. Philips Telecommunicatie Ind., Marconi's Wireless Telegraph Co., Siemens & Halske AG, and Davey Paxman & Co. [13]. Soon after, the C.A.T. became the Engineering Section of the Ministry's newly created Dirección de Telecomunicaciones (Department of Telecommunications).

Provisional Set-up

Two 100-kW and two 10-kW AM shortwave transmitters plus the metal parts required to erect the transmitting antenna field, suitable power transformers, and various accessories were acquired from Brown Boveri according to the contract signed with the Swiss firm in February 1960. One of the 10-kW units was rigged up in a 16-square-meter (± 16-square yard) hut near the place where the main building for the transmitting center was under construction (see Figure 2), and connected to an improvised rhombic antenna pointed at Caracas, Venezuela. This installation was used to carry out a short cycle of experimental broadcasting inaugurated on July

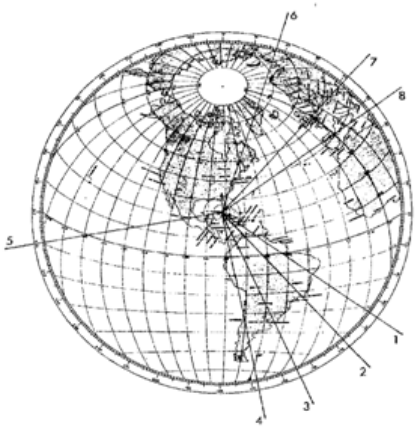

Figure 1. Rhombic antenna azimuths for the Bauta transmitting station (1961).

Figure 1

26, 1960. Ten weeks earlier, a 50-kW high-power medium-wave radio station installed in Swan Island, in the Gulf of Honduras, had started broadcasting towards Cuba an aggressive disinformation and subversive propaganda campaign, covertly operated by the CIA [14].

At the end of October, 1960, the main building for the station was ready to lodge the bulk of the equipment that had been stored elsewhere during the previous five months. Installation of the first 100-kW transmitter was then taken up by Cuban personnel under the supervision of a senior expert from the Brown Boveri company, and completed in about four months (see Figure on page 7). Experimental broadcasting with this transmitter started around the middle of March 1961. It was tuned to 6,076 kHz and made to feed a provisional antenna consisting of a folded dipole with 340º-160º maximum-radiation azimuth, which was capable of covering important areas of the Western hemisphere reasonably well [15].

[10] Consejo Asesor de Telecomunicaciones, *Informe Preliminar sobre la Instalación de una Estación Transmisora de Ondas Cortas en La Habana*, Part II (Havana: C.A.T., Ministerio de Comunicaciones, November 26, 1959).
[11] Consejo Asesor de Telecomunicaciones, *Informe Preliminar sobre la Instalación de una Estación Transmisora de Ondas Cortas en La Habana*, Part III (Havana: C.A.T., Ministerio de Comunicaciones, December 8, 1959).
[12] P. W. Luis Torres, *Dirección General de Telecomunicaciones-Comunicaciones Internacionales: Informe de Actividades del Año 1961* (Havana: Ministerio de Comunicaciones, September 29, 1962).
[13] Ibidem; and Altshuler, *Recuento de la Labor de un Año del Consejo Asesor de Telecomunicaciones (1959-1960)* (Havana: Ministerio de Comunicaciones, June 1960).
[14] James Wood, *History of International Broadcasting* (London: Peter Peregrinus Press, 1992), 176-182; and William Manchester, *The Glory and the Dream: A Narrative History of America, 1932-1972* (New York: Bantam Books, 1975), 899.
[15] Luis Torres, *Dirección General de Telecomunicaciones-Comunicaciones Internacionales.* (cited in 12 above)

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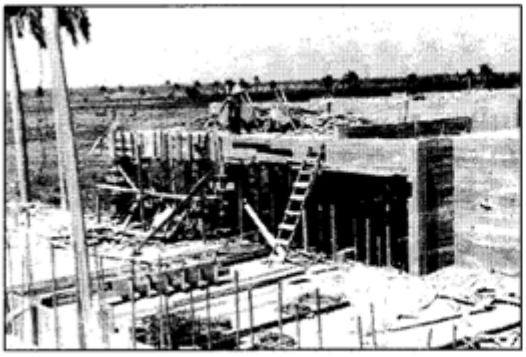


Figure 2. Early stages in the construction of the main building

Figure 2

On April 15, 1961, foreign B-26 bombers, painted as if they belonged to the Cuban Revolutionary Air Force, bombed airfields in Havana and Santiago de Cuba by surprise, killing nine people. This was immediately chorused by the international media as an attack by defectors from the Cuban revolutionary army. The next day Fidel Castro exposed the untruthfulness of this allegation in his address to the thousands of members of the national armed forces and militiamen who attended the victims' funeral. Among other things, he remarked that for the first time the country could rely on its new radio facility to fight foreign media disinformation, so that lots of people abroad could now directly access reliable information supplied by Cuba. The spectacular confirmation of this by the defeat in less than 72 hours of the then impending invasion, and the later acknowledgment of the responsibility for it by the U.S. President, became a credibility asset for the subsequent launching of Radio Habana Cuba.

Combining Shortwave Broadcasting and Point-to-Point Communications

Radio Habana Cuba officially was inaugurated on May Day 1961. By the end of the year, the planned installation of the Bauta shortwave transmitting center was nearly complete, after overcoming quite a few difficulties, among them the loss of several pieces of equipment confiscated by the American authorities when the ship that transported them to Cuba stopped over in Miami.

The antenna field extended over 130 hectares. It included 8 rhombic antennas. Two arrays with cardioid radiation patterns so oriented as to cover the Caribbean area shared the field with the rhombic antennas and the provisional dipole previously mentioned.

The building, conveniently located at a high point in the area to avoid being flooded during the rainy season, harbored four Brown Boveri AM transmitters and three Siemens independent-sideband transmitters, one 20/30 kW and two 10 kW.

A switching system was installed indoors to make it possible to connect each transmitter to any antenna of a predetermined group. It was operated from a desk in the main hall of the building which included a protection system to prevent incorrect operations.

[10] Consejo Asesor de Telecomunicaciones, *Informe Preliminar sobre la Instalación de una Estación Transmisora de Ondas Cortas en La Habana*, Part II (Havana: C.A.T., Ministerio de Comunicaciones, November 26, 1959).
[11] Consejo Asesor de Telecomunicaciones, *Informe Preliminar sobre la Instalación de una Estación Transmisora de Ondas Cortas en La Habana*, Part III (Havana: C.A.T., Ministerio de Comunicaciones, December 8, 1959).
[12] P. W. Luis Torres, *Dirección General de Telecomunicaciones-Comunicaciones Internacionales: Informe de Actividades del Año 1961* (Havana: Ministerio de Comunicaciones, September 29, 1962).
[13] Ibidem; and Altshuler, *Recuento de la Labor de un Año del Consejo Asesor de Telecomunicaciones (1959-1960)* (Havana: Ministerio de Comunicaciones, June 1960).
[14] James Wood, *History of International Broadcasting* (London: Peter Peregrinus Press, 1992), 176-182; and William Manchester, *The Glory and the Dream: A Narrative History of America, 1932-1972* (New York: Bantam Books, 1975), 899.

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Specialized channels between the transmitting center and the Ministry of Communications were provided by a Marconi multi-channel UHF link, while two Brown Boveri UHF links were used for receiving from Radio Progreso studios (in Havana) the programs to be broadcast. A small emergency studio furnished with Philips equipment for audio work was set up to make sure that shortwave radio broadcasting could carry on should the center be totally isolated from the capital. A 625 kVA diesel emergency-power-plant was installed to palliate eventual electric power failures. Supervision and shielded laboratory rooms were also set up for equipment monitoring, checking, testing, and repairing. Broadcasting to central Europe was inaugurated on October 24, 1961 [15].

Needless to say, a full fledged shortwave receiving center had to be built for working in conjunction with the appropriate Bauta transmitters and establishing truly professional point-to-point communications with different overseas stations. Erected at a place called La Chorrera, some 5 km from the Ministry of Communications' main building, it harbored 11 Marconi professional receivers. Its antenna field included 9 rhombic antennas, mostly in double space diversity operation, plus an inclined "V" antenna and a biconic omni-directional one. A Marconi UHF link for 11 telephone channels, 12 telegraph channels, and one service channel, all in duplicate, connected the receiving center with the Ministry, in addition to a telephone cable and a microwave link [16].

The receiving center was conceived not only as an essential component of the overseas point-to-point radio links, but also for general monitoring purposes, and later on, for radio location.

Point-to-point radio communication was inaugurated with Prague on May 9, 1961, and a similar service followed soon after in partnership with the Soviet Union [17]. Similar services with the United States continued to be handled by the older companies. *Prensa Latina*, the newly founded Cuban international press agency, developed its own transmitting and receiving facilities with Chinese- and U.S.-made equipment, and established shortwave press circuits with offices in various countries.

Impact on Engineering Training

Considerable experience had been accumulated in Cuba before 1959 regarding the commercial programming of nationwide radio broadcasting, but none at all regarding international broadcasting, so that when the opportunity arose, the C.A.T. invited a BBC specialist to come to Havana and enlighten the appropriate personnel on the special characteristics of international broadcasting, which he did [18].

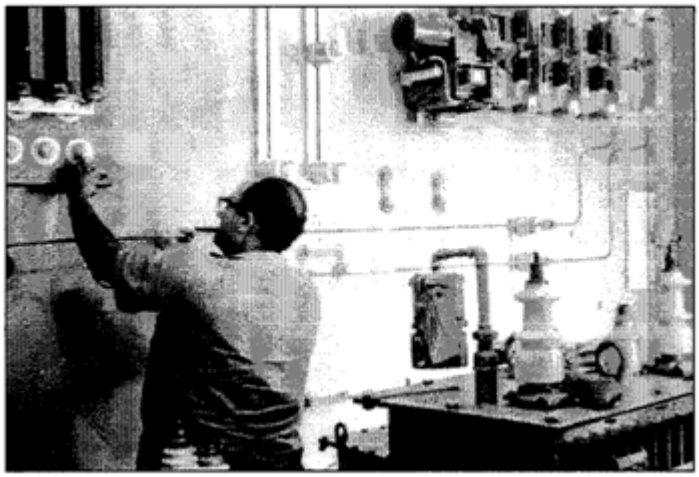
The above, however, was only incidental to the task taken up by the C.A.T. of creating suitable conditions for the training of engineers and technicians able to take care of the technical operation and maintenance of shortwave broadcasting and point-to-point communications equipment.

For a start, the C.A.T. set up from scratch a specialized technical library at the Ministry of Communication. By the middle of 1960, it already held nearly 1,500 volumes and several complete collections of important technical journals [19]. In addition, some relevant introductory material on shortwave communications was produced to help update those members of its personnel still unfamiliar with the subject [20].

Some of the senior members of the C.A.T. soon engaged in discussions at the University of Havana with a view to promote the incorporation of full-fledged electronics and telecommunications studies to the Electrical Engineering degree courses then taught, to be implemented with the part-time enrollment of some of the senior members of its personnel as teachers for the new courses. Eventually, this came to fruition, helped by a substantial assortment of brand new laboratory and demonstration equipment donated by the Ministry of Communications to the Faculty of Technology of the University of Havana for the teaching of electronics and telecommunications. It was decided that the new Electrical Engineering degree course would be made to consist of a basic bloc extending over the first three years and two specializations—Electronics, and Telecommunications and Power—extending over the final two years [21].

[15] Luis Torres, *Dirección General de Telecomunicaciones-Comunicaciones Internacionales*.
[16] Ibidem.
[17] "Investigaciones Radiofísicas en Cuba," *Comunicaciones* 15 (1974): 2 & 43.
[18] Altshuler, *Recuento de la Labor de un Año del C.onsejo Asesor de Telecomunicaciones (1959-1960)*.
[19] Ibidem.
[20] Altshuler, Notas Sobre la Radiocomunicación por Vía Ionosférica (Havana: C.A.T., 1960).
[21] Altshuler, "La Reforma de 1960 en la Escuela de Ingeniería y los Estudios de Electrónica y Telecomunicaciones," Chapter 7 in *Para una Historia de las Ciencias Físicas y Técnicas en Cuba* (Havana: Ed. Cientifico-Técnica, 2006).

"The Beginnings of Radio Habana Cuba"
José Altshuler (Conclusion)

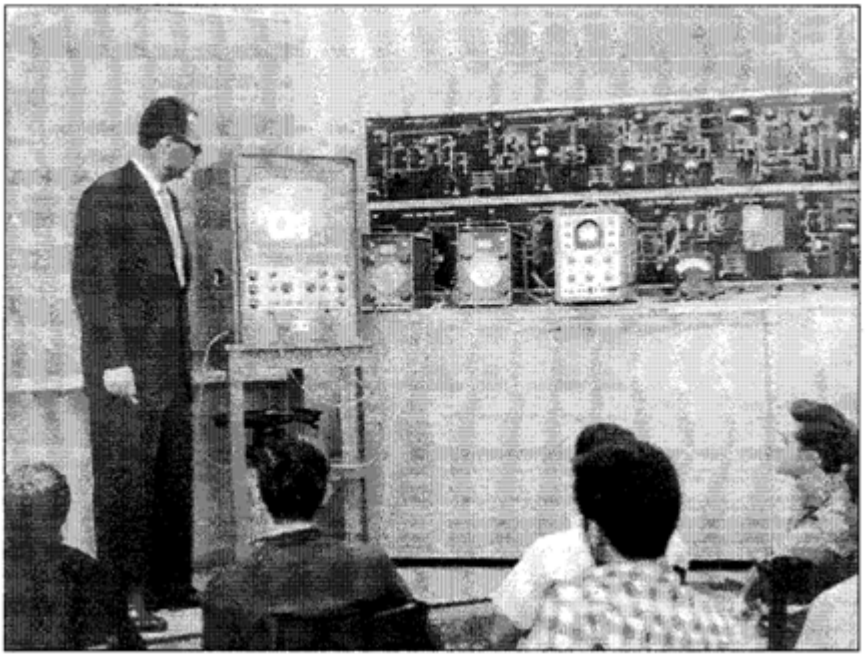


Installing the first 100-kW shortwave transmitter for Radio Habana Cuba at the Bauta transmitting center (1960)

Conclusion

The revolutionary government established in Cuba early in 1959 soon realized that the country must have some publicly owned radio communications means capable of directly delivering a message overseas. In less than two years a modern shortwave transmitting center was set up near Havana. It comprised a sizable directional antenna field, four transmitters for overseas broadcasting, and another three for point-to-point communications. A separate receiving and monitoring center was also built. Prompted by its own prospective need for trained personnel, the Ministry of Communications sponsored in 1960-1961 the inclusion of a full-fledged electronics and telecommunications specialization within the Electrical Engineering curriculum then taught at the University of Havana.

A lecture on electronics delivered to electrical engineering students at the University of Havana (1962)



Alex Magoun
"The Once and Future David Sarnoff Library"

The David Sarnoff Library (DSL) closed its doors at the end of 2009. For the previous twelve years I had the opportunity and privilege to develop its archival collections to encompass not just Sarnoff's largely public papers, but also R&D activities of the RCA Laboratories as well as individual staff members and other divisions of the company. These included RCA Americom, Broadcast Equipment, and Picture Tubes/CRTs in Lancaster, Pennsylvania. In this work I was aided by project staff and a steady stream of volunteers—young, old, and in-between—who helped organize, catalog, rehouse, or digitize papers, photos, and serials. Of less interest to Mercurians, perhaps, but useful when considering how to promote an intellectual asset with a relatively narrow constituency, we also developed public and school programming that drew attention to the DSL and its resources, especially its museum collection.

Less a victim of the recession than its own success, the increasingly popular public activities of the DSL ran counter to the business interests of the facility host, Sarnoff Corporation. Over the course of that year, I enjoyed the assistance of my board of directors and members of the New Jersey Antique Radio Club (NJARC) in identifying safe harbors for the Library's collections, and in packing them for shipment.

The assets divided reasonably neatly into archives and artifacts. The archival collections, which saw the attention of eight to ten visiting researchers and hundreds of inquiries every year, were transferred to the Hagley Library in Wilmington, Delaware. This was not a difficult decision after I affirmed that New Jersey lacked a facility with the interest, staff, and resources to preserve and make available what amounted to 2,200 linear feet (~670 meters) of materials. The Hagley already held the pre-1960 collections of the RCA library at its Camden, New Jersey, facility, including technical reports and photographs; the Nicholas Pensiero Collection; and the MCI Collection, which includes many of RCA's Globcom/Communications files.

The DSL's unique strength lies in the collection of RCA Labs notebooks. Read carefully in hand with associated technical reports, patent disclosures or patents, photographs, individual collections, and press releases, these give a unique and intimate view of the process of invention at the beginning of technological innovation—of color television, semiconductors, home video media, digital cameras, and sound technologies, among others. I was very pleased that Princeton University Ph.D. candidate Ben Gross could exhaust the relevant notebooks for his dissertation on the LCD, even as we inventoried and packed the other collections quite literally around him. A full treatment of RCA's efforts in electronic imaging or sound remain to be done.

One archival collection did not go to the Hagley. After some discussion with its staff and members of the New Jersey Antique Radio Club, we transferred the RCA Broadcast Equipment manual collection to InfoAge in Wall Township, New Jersey. The collection comprised some 200 linear feet (~60 meters) of technical manuals on RCA's transmitters, cameras, microphones, monitors, antennas, studio consoles, and even electron microscopes. While a small and increasingly well organized coterie of TV camera and radio transmitter collectors are interested in this resource, the collection had suffered greatly in our 2007 flood. Thanks to an outpouring of financial support, we had this and

Alex Magoun and Michael Geselowitz, Director of the IEEE History Center, standing in front of the David Sarnoff Library

Alex Magoun
"The Once and Future David Sarnoff Library"
(conclusion)

other assets freeze-dried, but the manuals had been repacked in random order. I am pleased to report that NJARC volunteers are steadily cleaning this Augean stable or archives, sorting and inventorying it at InfoAge. Prospective researchers should contact Steve Goulart for details: Steve@infoage.org.

The Sarnoff museum posed a far greater challenge. Over the years a number of larger organizations had expressed interest in borrowing or acquiring selected artifacts related to computers, David Sarnoff, television, and electron microscopy. My board agreed with me that the appeal of the DSL lay in the intellectual coherence of its collection, with the vast majority of RCA's innovations related to communication or information technologies and often stimulated by Sarnoff's long-term vision of personal, portable telecommunications. Thus, during the late spring and summer of 2009 board members and I discussed with or visited other institutions in an effort to find one that would accept the entire collection. Less plausibly we hoped that such an institution would arrange for some sort of permanent exhibition, rather than put the artifacts in storage to be used as needed.

The New Jersey State Museum and the Henry Ford Museum made the most powerful cases when board member Rosita Sarnoff met Dr. John Pollock, chair of The College of New Jersey's Communication Department, at their college reunion. Thanks to his interest and recruitment of college supporters, The College of New Jersey saw a renewed museum on its campus as an asset that could be used by all of its schools, from the Arts to Business to Engineering to Education. Coincidentally the college had recently opened its new library and had space in the older building in which to house the anticipated exhibits. In short order the DSL board agreed to transfer the bulk of the museum artifacts to The College of New Jersey, and members of the Sarnoff family made a generous gift to help underwrite the process. Several postwar RCA Victor televisions and consoles made in Camden, New Jersey, were transferred to the Camden County Historical Society, a 1946 model 830TS went to the State Museum, and one of the portraits of David Sarnoff was donated to InfoAge.

Since then, the Hagley has managed to make parts of the archival collections available to scholars who write ahead. They can be contacted through their website: www.hagley.lib.de.us/library/askhagley.html.

Archivist Lynn Catanese reports that the Herbert Belar and R. A. Lynn Collections (largely related to RCA's music synthesizer) have received MARC records in the Hagley's catalog along with revised finding aids; Harry Olson's papers (Acoustics Lab director) are next in line. The College of New Jersey is working steadily toward the redesign of exhibits focusing on creativity and innovation although the state's financial crisis has complicated the process. The website, www.davidsarnoff.org, continues online courtesy of webmaster Dave Sica and myself. Plans to post more of the digitization projects completed in the last six years of the DSL are continuing. Please contact me at: amagoun@davidsarnoff.org if you are looking for articles in RCA publications. Photo requests should go to the Hagley, which received a hard drive of the DSL's digital collections.
(Make photo requests via the website: www.hagley.org/library/usingmaterial/reproduction.htm)

The RCA Nipper Building today is the home of the Victor Lofts. It shares the neighborhood with Campbell Soup, Rutgers University, and the Camden Riversharks (baseball stadium) as well as the aquarium and the Dr. Ulysses Wiggins Waterfront Park.

Steve J. Wurtzler, *Electric Sounds: Technological Change and the Rise of Corporate Mass Media*

Reviewed by Heidi Tworek (Harvard University)

Steve J. Wurtzler. *Electric Sounds: Technological Change and the Rise of Corporate Mass Media*. New York: Columbia University Press, 2009. 416 pp. $36.00 (cloth), ISBN 978-0-231-13676-1; $26.50 (paper), ISBN 978-0-231-13677-8.

In *Pieces of Sound*, Steve J. Wurtzler wrote an innovative study of the contested introduction of electric sound technology in America from the mid-1920s to the 1930s. Wurtzler's examination of sound technology as "a transmedia phenomenon" (p. 9) demonstrates ably how we can, and indeed must, rethink connections between the phonograph, radio, and synchronous-sound film. Taking his cue from the observation that all three media use the same apparatus to transmit sound for different applications, Wurtzler investigates both the economic base of these technologies and struggles over their social meaning. His well-argued and thought-provoking study will provide historians with an understanding not only of the development of media corporate culture but also of parallels to our present issues of digitalization and assimilation of new technology.

Wurtzler links the phonograph, radio, and synchronous-sound film through their use of electrical acoustics defined as the implementation of electrical energy in disseminating sound. Wurtzler's story is not of a teleological triumphal march of electric sound. Rather, he also considers failed technologies such as sponsored films in 1930s Hollywood. With Trevor Pinch and Wiebe Bijker's model of the Social Construction of Technology as his guide, Wurtzler traces the "closure mechanisms" (p. 12) of meaning for electric sound. He does so using contemporary trade and popular periodicals and published industry sources.

"Science Finds, Industry Applies, Man Conforms": this slogan (p. 118) from the 1933 Century of Progress Exposition guidebook, perfectly conveys the media corporations' attitudes that Wurtzler investigates in the main body of his work. Wurtzler discusses the economics of "industry applies," demonstrating how large media corporations, such as AT&T, General Electric, and RCA, emerged by the early 1930s through intelligent purchasing of patent rights, licensing, and capital investment in research and development. These companies built on their strong economic base through attempts to dictate both the narrative of how "science finds" by omitting failures and how man should conform to acoustic media. As Wurtzler argues convincingly, corporations presented their interpretations of sound media as an instrument to promote national unification and "consumer democracy" (p. 224). In so doing, they used models from preexisting practices. The radio's place in the home, as described in chapter 3, for example, was modeled on the phonograph's successful redirection from an instrument for business and public performance to an apparatus for domestic entertainment.

One of Wurtzler's most helpful conceptual models is his discussion of sound representation in film. Chapter 5 presents two epistemological paradigms: "transcription" (sound technology as an instrument to document real-world acoustics) versus "signification" (electric sound as a means of expression and experimentation with sound). Finally, a consensus of "signifying fidelity" emerged, i.e., to "use the creative potential of electrical sound technology to signify the mimetic relationship to an (often nonexistent) original sound event" (p. 18).

A few minor issues mar *Electric Sounds*. Possibly a result of decisions by Columbia University Press, there is an index, but no bibliography, and the end notes contain much valuable commentary and explanation, which meant much flipping back and forth during reading. Wurtzler also never explains why he excludes the telephone from his study. Finally, what about sources other than periodicals? While Wurtzler mines these to great effect to illustrate the meanings large companies and journalists offered to the public, I would have liked him to investigate the impact of these presentations on consumers. Sales figures, cinema attendance, or letters to editors may have proven fruitful.

Ironically, despite investigating "closure mechanisms," Wurtzler's conclusion "stubbornly resists imposing closure" (p. 280). Of course, electric sound was never reduced to one meaning. Pirate radio in the 1950s and 1960s is one example of its constant contestation. Yet, I would have liked a conclusion with fewer anecdotes about 16mm film collections at a New England liberal arts college and more explanation of how the radio, phonograph, and sound film strengthened connections between consumerism and American patriotism. The virtues of Wurtzler's work lie in its new approach and its presentation of how large media corporations sought to influence the public's interaction with sound, rather than that public's reactions.

Leonard Dudley, *Information Revolutions in the History of the West*

Reviewed by
Eric Jones, Melbourne Business School

Leonard Dudley. *Information Revolutions in the History of the West*. Cheltenham, UK: Edward Elgar, 2008. xi + 347 pp. $150 (cloth), ISBN: 978-1-84720-790-6.

Leonard Dudley, a Canadian now at the University of Montreal, once formalized part of Harold Innis's work on the role of communications in the history of empire. In his current book, Dudley tries to isolate the effects of information revolutions in the whole grand sweep of the history of the Western World. This project is worthy of Innis and is a logical one for our time, when changes in information technology (IT) and their societal impacts are so visible. Others have been nibbling at the cherry but Dudley has been left plenty to investigate.

A full 85 percent of *Information Revolutions* is devoted to nine episodes in which the proposition is that new technologies, including developments such as the standardization of languages and scripts, were followed by rapid changes in society, politics, and economics. The author does not assert outright that the inventions and their diffusion caused the wide changes that followed, but he obviously thinks this was the case. The nine episodes center on the following phenomena: the consolidation of the Carolingian empire, the Norman Conquest, the impact of Lutheranism, the fall of Charles I, the Reform Bill of 1832, the American Civil War, the Spanish-American War, the entry of the UK into World War I, and a supposed link between the dissolution of the U.S.S.R. and the fall of the Twin Towers. Each event is recounted in well-informed, well-documented, and well-presented detail. Their precursors and the historical context tend to get more space than the consequences.

Most readers will learn a great deal from these sections, since few will be familiar with every episode. The accounts of the Spanish-American War—of Alfred Harmsworth and his mass production of debased newspapers—and of the Cold War seem the most compelling, despite the fact that the last two are much the most familiar among the cases. Yellow journalism is always fun to read about, though it is unclear just how much we should glory in the spread of literacy (exaggerated in Dudley's figures), if its crowning achievement is an ability to read tabloids. Education, judgment, and literacy are different things. Any hesitation with which the reader may be left, however, will not concern the narratives but be a faint uncertainty as to why this, rather than some other set of cases, was selected. Dudley's answer will be plain: the examples serve as well as any to demonstrate the recurrent force of richer mixes of information.

A slightly greater hesitation may attach to the dramatizing nature of the expositions. Each invention and its dissemination are portrayed as rupturing the historical continuum. The skeptical mind might muse that the economy was often reshaped by less discontinuous change. Dudley gives a lot of space, more conventionally, to Morse and pays special attention to the fact that Grant used the telegraph for coordinating simultaneous attacks on the Confederacy. Although the subject has not hitherto received proportionate scrutiny, no one doubts that IT has repeatedly made a big difference to the world, but it remains a tad moot whether Dudley's emphasis on revolutions is always warranted.

One difficulty with jump-starting history via new technologies is that on their own the devices remain inert. Something, or rather somebody, has to put them into the productive system: innovation trumps invention. Hence, if we consider the example of Gutenberg's printing press, we find Dudley makes the large claim that it began to generate a new type of society in early seventeenth-century Britain. This proposition follows the line to which he hews throughout: that new information technologies spark great social, political, and economic changes. Yet, if the printing press were so potent, why had it not succeeded already in remolding the societies of China, Japan, and Korea? Special interests and the political order muzzled the effects there. New technologies may be necessary conditions for certain types of change, but they are not sufficient ones. Dudley is well aware of the significance of processes of diffusion and devotes half his space to them but does not pay much attention to contrary cases.

He frames the consequences of novel technologies in terms of network effects and economies of scale in information storage. The insistence that each episode supports his contention that IT necessarily has a revolutionary impact, as opposed to playing one important role among many, is harder to concede. The historical narratives in this book are exceptionally worth reading for their own sake.

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Please send all other correspondence and questions via e-mail to: MERCURIANS@EARTHLINK.NET.

Editor:
Andrew Butrica
Bethesda, MD 20814
abutrica@earthlink.net

Assistant Editor:
Prof. Christopher Sterling
Associate Dean
Columbian College of Arts & Science
George Washington University
801 22nd St, Suite 212
Washington, DC 20052 USA
chriss@gwu.edu

Assistant Editor:
David Whalen
Chair, Space Studies Department
John D. Odegard School of Aerospace Sciences
4149 University Avenue, Stop 9008
Grand Forks, ND 58202-9008 USA
whalen@space.edu

AUTHOR CONTACT INFORMATION

José Altshuler
Cuban Society for the History of Science and Technology
jea@infomed.sld.cu

Heidi Tworek
Minda de Gunzburg Center for European Studies
Harvard University
hevans@fas.harvard.edu

Eric Jones
Professorial Fellow in Economic History, Melbourne Business School
e.jones@mbs.edu