The Davis Amendment and The Federal Radio Act of 1927: Evaluating External Pressures in Policymaking

In March 1927, the Federal Radio Commission (FRC) undertook the task of sorting out the interference problems and setting a regulatory agenda which would shape the nascent broadcasting business in the United States, a business that was less than seven years old. Conceived by Congress as a hurried solution to the interference problems of 1926, the Federal Radio Commission undertook the unenviable task of creating a new agency without any resources allocated to it. Additionally, the full membership of the Commission was not ratified by the Senate and it lost two of its members within the first year. It is not surprising to discover, therefore, that the work of the Commission met with dissatisfaction among members of Congress, distrust by the public, and attempts to rifle specific agendas through by large broadcasting and radio manufacturing interests.

The original legislation creating the Federal Radio Commission called for a one-year tenure for the agency, subject to reauthorization by Congress. During the reauthorization hearings, Representative Ewin Davis (R) of Tennessee charged the FRC was doing the bidding of the large broadcast interests and that the agency had failed to meet its mandate to create service for all Americans.

Davis introduced an amendment to the reauthorization bill that declared all Americans were entitled to equality of radio broadcasting service, both of transmission and reception. The amendment called for equitable allocation of licenses, wavelengths, time, and station power to each of the states according to population within each zone. The purpose of the amendment was to make the intentions of Congress clear to the members of the Federal Radio Commission.

Before and after amendment's adoption, public relations campaigns both for and against the implementation of the amendment's provisions heightened public awareness of both the Federal Radio Commission and the problems that it faced. Posturing about the difficulty involved in trying to implement the equality of service provisions led the Federal Radio Commission to become reactive to the influence of various members of Congress, to the pressures of the electronics industry, and to the needs of smaller regional broadcasters. The reactive stance helped set the mode of operation and the public posture for the Commission for the first years of its existence. The outcome of the Commission's work between the years 1927 and 1933 resulted in the creation of a local/ regional broadcasting service that relied heavily on a system of large and small broadcast stations that carried network provided, commercially oriented radio programs designed primarily for commercial entertainment.

A reading of the trials and tribulations of an upstart federal bureaucracy might make for an interesting, even nostalgic look at the birth of radio regulation, but one could question the importance of studying the adoption and

implementation of the Davis Amendment now. Broadcasting historian Susan Douglas reminds us that we can look at "old articles about radio fever as fanciful and misguided stories of little consequence, or we can take them seriously, and analyze the connections they reveal between technology and ideology."[1] As the Federal Radio Commission was being created there were powerful institutional forces seeking to influence the decisionmaking process. Their roots were political, economic, technological, and social, and the interaction between those influences produced a situation calling out for regulatory control. Congress responded with compromise legislation, written broadly, allowing independent commissioners the freedom to develop a new systematic paradigm for regulating broadcasting in the United States. However, In the *End of Liberalism*, Theodore Lowi writes that compromise legislation which marked the beginnings of many regulatory agencies often called for unclear, contradictory goals. Lowi found many regulatory statutes were void of meaningful guidelines beyond the abstract requirements to serve the 'public interest.'[2] Did the vague, compromised language that created the Federal Radio Commission make it impossible for a new structure of broadcasting to develop? Would the FRC Commissioners have the ability to separate their regulatory responsibilities from their political responsibilities? Were the technical limitations of the medium destined to define the solutions possible to the equalization clause?

Through an examination of the issues and problems that compelled the Federal Radio Commission to adopt certain policy decisions that met the legislative requirements of the Davis Amendment, I hope to illuminate some of the unintended consequences of deliberate legislative acts. The FRC began the regulation of wireless communication, and today's industry is still bound in some ways to the regulatory stances carved out during these early days. For example, the Federal Communications Commission is still bound by the regulatory procedures started by the FRC. Could a study of the initial controversies illuminate our knowledge about the commission's expectations for structuring the industry, along with the resultant outcomes for reducing interference? As a corollary, can we discover any insights regarding the industry's expectations from the commission?

Karl Popper suggests that the study of linkages between intentions and outcomes can produce insights into why the actions of historical actors who set out to accomplish one set of goals might produce unanticipated or contrary results.[3] Popper's suggestion holds promise for the study of broadcast regulation. For example, did the Commission's desire to create a quick solution to meet the rigid requirements of the Davis Amendment contribute to the notable reduction of nonprofit broadcast stations?[4] Was there a concern by the FRC or consulting engineers that the new technical plan described in General Order 40 could only be met by commercial stations able to buy expensive new equipment to meet a set of more stringent technical regulations? Such a proposition, though not definitively accepted in the current literature, is not without possibility.[5] Still, such a proposition opens a speculative, but viable set of explanations as to why commercial broadcasting emerged during the earliest days of radio and why a more public service orientation in radio did not surface until the creation of the FM band.

Surprisingly, while some scholars have focused on either the history or the workings of the Federal Radio Commission, few have focused on the significance of the external pressures on the Commission that may have prevented it from resolving the interference and technical problems in its own way and within its own time frame.[6] If we examine the interests, motivations, and behaviors in the institutional setting of the Federal Radio Commission against the interdependent interests and motivations of Congress, the large broadcast trust, and the National Association of Broadcasters, we may gain insights into the decisions and the decisionmaking process?

This paper will briefly outline the events that occurred before, during, and after the passage of the Davis amendment, look at the interaction among the various players, and identify the interests they sought to further. Finally, I will examine the decisionmaking process of the Commission in deciding how to implement the equality of service requirements of the Davis Amendment.

I. The Federal Radio Commission. The First Year

According to the first *Annual Report of the Federal Radio Commission*, "a wholly new Federal body was called into being to deal with a condition which had become almost hopelessly involved during the months following July 3, 1926."[7] Congress had failed to create proper legislative oversight earlier in 1912 when it gave supervisory responsibility to the Secretary of Commerce and Labor. This failure to provide proper regulatory oversight came back to haunt Congress a decade later when Secretary Hoover found he lacked the authority to revoke station licenses, assign power levels or times of operation.[8] Radio's growth was explosive.

Congress needed to do something fast; the question was 'what to do?' Lowi reminds us that regulation is only one of several ways governments seek to control society and individual conduct. And since there are some specific purposes that are best pursued through regulatory techniques, we should be able to observe a distinct set of political-process consequences associated with this kind of government commitment.[9] Scholars disagree as to why legislators wanted an independent commission. There may have been some reluctance to trust the Secretary of Commerce and Labor since Hoover was seen as closely aligned with large broadcast interests.[10] After consideration, perhaps Congress decided that an independent regulatory commission could best deal with the seemingly intractable interference problems that had developed as a result of the breakdown of the Radio Act of 1912.[11] Or, perhaps Congress was reluctant to adopt any of the earlier bills retaining the supervision of the Secretary of Commerce since they failed to gain partisan support in Congress. However, when Attorney General Donovan declared the existing regulation unconstitutional, the mounting interference crisis made radio reception almost impossible in many parts of the country. Amid mounting complaints from the rapidly growing broadcasting industry and local constituents who were eager to listen, legislators moved to create emergency legislation.[12]

Representative Wallace H. White (R- Maine) sponsored a bill in the sixty-ninth Congress giving authority to the Secretary of Commerce to grant licenses, assign wave lengths, and allot time to broadcasters while Clearance C. Dill (D-Washington) sponsored a bill in the Senate that created an independent five member commission to have almost total control over broadcasting. Though both bills passed in their respective houses, the conference committee was unable to reconcile the difference before adjournment of the first legislative session.[13]

Continuing public outcry about the deteriorating listening situation around the country forced legislators into action. A compromise was reached early in the new year; the Radio Act of 1927 passed and was signed into law by the President on February 23, 1927. The Act incorporated parts of both house and senate bills by creating a the five-member commission on a temporary one-year basis to assign broadcast license and bring order to the chaos of the airwaves. After the initial one-year period, licensing authority would revert back to the Secretary of Commerce, while the FRC would act as a sort of Court of Appeals for broadcasters. According to the Act, certain non-policy functions were to remain with the Commerce Department.[14]

The Radio Act of 1927 gave the Commission authority to grant or deny licenses as would best serve the public interest, assign frequencies, times of operation, and power output. Section 9 of the Act instructed the Commission to remove inequalities in geographic distribution of broadcast facilities that had developed prior to the Act. Congress succeeded in appointing three of the five commissioners, and *The Outlook*, a news magazine of the period, claims that politics played a part in preventing several of the commissioners from gaining confirmation. At the end of the legislative session the Federal Radio Commission was only partly filled and had no appropriations budget. Other government agencies assisted with personnel and space as the Commission struggled to begin the task of creating a new federal agency without resources.[15]

Documents of the early days of the Federal Radio Commission show that one of the first issues discussed was a plan for frequency allocation and a timetable for implementation. This was necessary because section one of the act automatically terminated all existing licenses.[16] Following a precedent set by Secretary of Commerce Hoover, the FRC held hearings in late March to solicit opinions from broadcasters. The focus of these discussions centered on the issues of allocation and the engineering concerns surrounding the interference problem. McChessney notes that these sessions were dominated by testimony of corporate-affiliated radio engineers.[17]

The outcomes of these discussions are reflected in the actions of the Commission and a plan they begin to implement. For example, General Order 11(amended by General Order 13) issued on May 21, 1927 terminated all licenses, required all stations to file applications concerning their current status, and made radio stations subject to the provisions of the Radio Act of 1927. Included in the minutes for the meeting of May 21 is a statement that recognizes that "no scheme of reallocation which does not at the very outset eliminate at least four hundred broadcast stations can possibly put an end to interference."[18] This early declaration by the Commission suggests

that the FRC recognized the need to clear broadcasting interference through attrition of stations, reallocation of assignments, and reauthorization of power outputs. However, the actions of the FRC during this first year illustrate a much more conservative body.[19] It may be that given the tenuous nature of the commissioners' appointments and the lack of funding, the newly formed agency did not want to rock the boat. It may be that coercive actions from Congress or industry made the Commission tread lightly, but during the first year few station licenses were revoked.

Throughout much of 1927, the FRC acted less like a regulatory body and more like a technical agency. Documents indicate the FRC moved congested stations to less congested spots (frequency assignments) on the radio dial rather than reducing the number of licenses. A series of channel assignment changes made during this period helped some; however, the overall problem of overcrowding and interference was not eliminated.[20] These early orders moved various stations from one allocation to another to alleviate interference problems among 'local listeners.' However, as the winter approached, rural areas still suffered from significant interference. General Order 19 provided for the large scale transfer of station assignments to clear all frequencies between 600 KHZ and 1000 KHZ from 'heterodynes' (sic) and other interference.[21] However, the intention of the Commission was to hold the industry in status quo while the agency sought recognition and money from Congress to execute its charge. Testifying to an oversight committee of the House, Commissioner Skyes stated,

> (W)e concluded it was our responsibility under the law to first give a fair trial and see if it were possible to let all of these stations live....(I)f we had denied 150 or 200 station licenses at that time, in my judgment and in the judgment of the commission, we would have had so many law suits and possibly temporary injunctions granted against us that practically the whole of the broadcast band would have been tied up....[22]

Analysis of FRC General Orders and Minutes during its first year indicates that the Commission attempted to resolve the various interference problems on an ad hoc basis.[23] These attempts produced mixed results in the various regions of the country. FRC rulings seemed to ignore their responsibilities under Section 9 of the Act and instead ensconced commercial broadcast interests, particularly the large chain broadcasting stations and affiliates.[24] Members of Congress charged the Commission with favoring large broadcasters from the East while discriminating against the listeners in the South and West.[25] Commissioners vigorously denied the charges but when the new Congress convened, oversight hearings and newspaper accounts of public reaction to the Federal Radio Commission indicate that it had not succeeded in fulfilling its goals.[26] A House report reflected the displeasure of its members:

> The set-up in the broadcasting field which it was believed at the time the radio act was passed could be worked out in a year's time had not been effected. We are confronted with the dilemma of continuing the commission in authority for another year during which it is hoped the situation may be improved.[27]

In hindsight, it appears that the Federal Radio Commission did not see that political problems would develop as a result of its policy of maintaining the status quo in broadcasting while trying to resolve most interference questions on a case-by-case basis. One could argue that without the legislative mandate of proper funding and a fully confirmed commission, the FRC lacked the political clout to resolve the technical problems it was created to fix; thus the commission argued that it tried to avoid legal challenges which might further prevent implementation of the Act.[28] Congress, on the other hand, recognized the dissatisfaction among its constituents very clearly and sought to rectify the situation during the Commission's reauthorization process. Led by members from the south and the west, Congress amended the FRC's reauthorization bill to correct broadcasting's geographical imbalance.

II. The Fight Over the Davis Amendment

The Seventieth Congress took no pity on its stepchild. Rosen says the two members most responsible for the creation of the FRC fiercely attacked its lack of accomplishments. Clarence Dill chided the 'cowards and dullards' for their inability to develop a plan to reduce broadcast stations while allowing themselves to succumb to the influence of the radio trust. Representative White complained that the FRC policies had complicated the situation. Both White and Dill echoed their colleagues by insisting that the only solution to the interference problem was the elimination of some broadcast stations. Led by Representative Davis, Congressmen from under-represented regions of the country protested that the FRC had failed to distribute facilities equally among the states.[29]

During an oversight hearing, Representative Davis served notice to Commissioner Sykes that he intended to change language in the Act to remove any vagueness about the Commission's responsibility.

> *Mr. Kading*: ....do you not think it would be very important to act upon the suggestion of the chairman of preparing an amendment to be introduced in Congress clarifying the matter (interpreting equally of service)?
> *Commissioner Sykes*: Personally, I would be glad, of course, if Congress would clarify it. I would not like to have to undertake to draw the amendment, though; I would have to leave that to you gentlemen.
> *Mr. Davis*: In other words, your opinion is, naturally, even from the point of view of the commission itself, it is highly important for whatever statutory provisions are enacted for your guidance to be unambiguous and about which there can be no controversy or conflict of opinion.
> *Commissioner Sykes*: I would be delighted, Judge, to see it at my rest.
> *Mr. Davis*: I want to state I am in thorough accord with that and, so far as I am concerned, will undertake to effect that result.[30]

With the introduction of the Davis Amendment to section 9 of the Act's reauthorization bill, a political debate ensued over the precise meaning of the 'equality of service clause' and whether passage of the reauthorization with its

inclusion would create a better radio service or hamstring the Commission in its work. Depending on what interests one held, the amendment was designed to either destroy broadcasting or save it. There seemed to be little middle ground. For example, Senator Dill said the language of the new bill made it unworkable and impracticable and blamed the FRC for disregarding the equitable service provisions of the 1927 law.[31]

Industry leaders lobbied heavily against the amendment provisions. David Sarnoff, Vice-President of Radio Corporation of America, stated, "(I)t is my hope that Congress will not pass a bill, the technical provisions of which, to my mind cannot be of help either to the listening public or to broadcasting stations."[32] Even members of the Federal Radio Commission got into the fray. Commissioner Caldwell stated that the "rider would wreck our present wonderful radio broadcasting structure" and claimed the amendment" is not practical and must be discarded in the search for a way to reduce the number of stations." Meanwhile the *New York Times* speculated, "(W)ill the Ides of March in 1928 go down in history as a turning point in 'radio'?"[33]

The heated debate crossed party lines making it difficult to assess relative support for the bill. Support for the bill appeared to be tied to supporting regional constituent desires for either more radio service or for maintaining the status quo. For example, Representative White, a powerful Republican from Maine aligned himself with Representative Davis, a Democrat from Tennessee. House Democrat McKeon from Oklahoma stated that if the "house failed to adopt the 'equitable distribution' provision he would offer a resolution call for an investigation of the (radio) 'trust'."[34] All of these congressmen had constituents who desired better local service. But, House Democrat Emanuel Cellar from New York said, "the amendment which the committee made to the Senate bill, to my mind, will put radio art into a straitjacket."[35] During February the FRC undertook several measures to appease southern supporters of the Davis Amendment.[36]

Outside organizations with an interest in radio also lobbied Congress against adoption of the Amendment. The *New York Times* covered the reauthorization bill extensively. At one point it described the political maneuvering in Congress as if it were describing a battle scene:

> Honors are even in the radio war being waged in Congress. Commissioner Caldwell opened the hostilities with an attack on the Watson bill. A few days later Senator Dill raided the Commissioner's position. Reinforcements in the form of Representative Davis, Tennessee, came to the Senator's aid. Just when it seemed the Commissioner might be forced to beat a strategic retreat, the National Association of Broadcasters, Inc. hurled its shock troops in the breach caused by Davis' flank attack on the Commissioner's left while Senator Dill was hammering his front. It appears radio is in politics![37]

Despite the best efforts of the NAB, the radio 'trust' and members who opposed it, the reauthorization which included the Davis Amendment's 'equitable distribution' requirements passed by a large margin on March 28, 1928.[38] The clause amended Section 2 of the Radio Act to read:

> ....that the people of all zones.... are entitled to equality of radio broadcasting service, both of transmission and of reception, and in order to provide said equality the licensing authority shall as nearly as possible make and maintain an equal allocation of broadcasting licenses, of bands of frequency or wave lengths, of periods of time for operation, and of station power, to each of said zones when and in so far as there are applications therefor: and shall make a fair and equitable allocation of licenses, wave lengths, time for operation, and station power to each of the States, The District of Columbia, the Territories and possessions of the United States within each zone, according to population.[39]

The FRC was directed to carry out the equality of service requirement "by granting or refusing licenses or renewals of licenses." As if to make it clear that the Commission should do its bidding, Congress set all the Commissioners' terms for expiration on February 23, 1929. The message from Congress seemed to be 'get it done in a year or we'll get new commissioners.'

With all of the apparent opposition to the Davis Amendment why did this version of the reauthorization bill emerge from committee and pass? Rosen suggests that it passed to appease Southerners who threatened to delay a vote on the reauthorization legislation. It may be that some members worried that a defunct FRC would mean that the United States would plunge into further broadcasting chaos without a regulatory body. Legislators did not want to face that eventuality and since the Commission's authority had already expired, this appeasement may have been the expedient political accommodation necessary to reinstate the FRC. Other members of Congress were concerned that without passage of the reauthorization, administration of radio would revert back into the hands of the Department of Commerce.[40]

III. The Davis Amendment and the Allocation Plan

With the passage of the amendment, the Commission members now faced the problem of implementing a plan they had publicly criticized. However, faced with the reality of the situation, the Commission had to formulate a plan to meet the specific requirements of the amendment. Louis Caldwell, Chief Counsel of the Federal Radio Commission, wrote, "(I)t would be hard to conceive of a more baffling problem than the one which Congress imposed upon the Federal Radio Commission by the so-called Davis Amendment."[41] Caldwell complained that before the amendment the Act allowed the Commission a certain latitude in making its license distribution among the different states; the flexibility was now gone because of the rigid requirements set forth by the new language.

Nevertheless, faced with the specific requirements of the Davis Amendment, the FRC undertook steps to devise an allocation policy that would bring station assignments into compliance with the newly amended Radio Act. There was disagreement among the Commissioners as to the precise meaning of the amendment. The majority of the commission construed it as requiring immediate reallocation of the broadcast band while Commissioner Robinson claimed the amendment required the Commission to adopt a policy to be followed in the future where equalization would be attained where ever possible. The commission also grappled with the question of whether the amendment required an equality of the number of licensed stations without regard to division of time or whether two or more stations dividing time could be balanced against one full time station in another zone.[42] Each interpretation created a problem for the FRC since each interpretation called for a different engineering calculus.

At the end of March a working group from the Institute of Radio Engineers (IRE) submitted a memorandum to the Commission describing a plan for classifying the 90 broadcast channels into three groups of licenses. The plan called for the creation of national, regional and local broadcasting services. Under this scheme licensees would be apportioned equally to all five zones.[43] The study was reported out on April 6, 1928, when the Commission asked radio engineers, under the supervision of Dr. J. H. Dellinger of the U. S. Bureau of Standards for their recommendations to implement the allocation plan.[44]

Also during this time the Federal Radio Commission began to solicit the expert opinion from members of the Institute of Radio Engineers such as L. E. Whittemore, in addition to using experts at the U. S. Bureau of Standards, Captain Guy Hill from the Army Signal Corps. and the other engineers from consultative or technical groups.[45] The obvious complications of the equalization clause required the Commission to attempt to become more sophisticated in its approach to solving the radio interference problem. But, now the Commission found itself facing increasing pressure from Congress.[46]

By April 1928, the initial plan proposed by the Institute of Radio Engineers was fleshed out. Briefly, the plan created a zone-based allotment scheme for the 90 channels available in the standard broadcast band. It called for the creation of 50 high powered stations that would operate on 'cleared channels.' Ten stations were to be assigned to each zone of the country. Because these stations were assigned the sole use of the channel (clear channel) during the nighttime, no heterodyne interference would occur and reception of these high powered stations would reach into the furthest sections of rural America. The remaining 36 channels would be divided between stations that served the regional and local needs of the various zones. Each zone would receive 10 of these secondary channels. Because these secondary stations were lower in power, engineers believed it would be possible to assign more than one station to each region of the country.[47]

The Institute of Radio Engineer's plan did not meet with widespread approval from either Congress or the broadcasting industry. There were two major problems with the plan. First, it called for a maximum of 340

stations, a reduction of nearly 350 stations from the current allocation. Secondly, new higher powered clear channel stations did not fit into the scheme envisioned by members of Congress seeking to appease their constituents. Ewin Davis, author of the equalization amendment, lamented "the tentative plan is overloaded with so-called national stations...." Later that April the National Association of Broadcasters, the Federal Radio Trades Association and the Radio Manufacturers' Association proposed a wholly different interpretation of the Davis Amendment. The NAB, fearing a reduction in the number of licenses, offered a plan that attempted to maintain the status quo of assignments as much as possible. The National Electric Manufacturers' Association and other broadcasting station groups also submitted various allocation plans to the Commission.[48] No one plan seemed to meet the specific requirements of the equal allocation clause. While the IRE's plan seemed to have the inside track because it had the support of J. H. Dellinger, the *New York Times* reported members of the National Association of Broadcasters were disenchanted with the proposal, calling it too theoretical. The NAB and NEMA also called for an investigation of the agreements made by members of the radio trust.[49]

Why was a logically designed plan, incorporating some of the best engineering theory of the day, unacceptable to those with political or industry influence? There were major obstacles to implementing the engineers' proposed solution. First, equalization would require the Commission either to target zones with more stations and reduce the number of licenses in those zones, or increase the number of licenses in the zones that were under served thereby increasing the number of stations and the interference level overall. The former plan would rile Congress by eliminating many constituent radio stations. And, while the latter plan might be a political expedient, it would not eliminate the interference problems that the FRC was created to resolve. In either case, there was also some concern that whatever plan was adopted, the plan would permanently freeze the number of broadcasting stations.

Similarly, the equalization clause required making the number of licenses allotted to the various zones proportional to the populations of the states within each zone. Thus it was possible that even though a zone may have the correct number of licenses, once the FRC decided whether to increase or decrease the number of licenses, the zones would have to redistribute those licenses among the states if their number did not reflect the correct population ratios. Further, while the engineer group's scheme began to address one of the equalization requirements of the Davis Amendment, the division of power allocations among the zones, their plan also needed to address station power and time division within the zone and among the states based on population.[50]

The FRC felt obligated to start the process of reducing the number of licenses in order to implement the new allotment scheme.[51] General Order No. 32, issued on May 25, 1928 asked for 164 broadcasting stations to show cause why they should continue to be licensed. Most of these stations were located in highly populated states in the East and Mid-West. No stations from the South were included in the Order. Over the summer a number of licenses were disposed and other stations included in this group had their hours of operation or power sharply curtailed.[52] While the engineering staff under J. H. Dellinger grappled with the difficult problems posed by the

equalization clause, the Commission provided an outwardly visible demonstration that it was dealing with the questions of allocation and division of service by eliminating small and marginal broadcasters.[53] Ready to avoid controversy for its actions, the FRC issued two lengthy documents on August 23 and September 1, 1928 describing the Commission's application of a vague public interest standard in reviewing the stations examined in General Order 32.[54]

Hugh Slotten contends that the engineers' view became dominant because key members of the commission believed that rancorous political debate would be avoided if the solution was based primarily on the use of technical reason. Engineers interpreted the "public interest" standard as one that provided the best possible service based on engineering standards and technical efficiency.[55] Since Congress failed to define the meaning of public interest, the technical definition could be construed as easily as any other definition. Supporting this thesis is the fact that some Commission members argued that equalization and reallocation were fundamentally technical problems demanding technological solutions. [56]

Slotten's thesis is enticing but not wholly supported by the engineering facts reported out in the Federal Radio Commission's Annual Reports for 1928 through 1931. For example, the broadcast section of the FRC's annual reports of 1930 and 1931 under C. B. Joilleff and V. Ford Greaves detail a much more complex matrix of engineering data than previously included under J. H. Dellinger in General Order 40. Also, the Commission abandoned the quota system that it applied in 1928. Starting with General Order No. 92 issued June 17, 1930, a 'unit system' of evaluation to determine equalization compliance was adopted that included information about type of channel, power, hours of operation, and other considerations. The unit system provided a richer data set for analysis, but it also provided some indication that true equalization would never be achieved.[57]

IV. General Order 40 - Making Lemonade out of a Lemon

On August 30, 1928 the Federal Radio Commission issued General Order 40, a plan outlining a quota system for the reallocation of broadcasting stations. Immediately the Commission began a public relations offensive to convince politicians, broadcasters, and the public alike that the scheme was the best possible solution to meet the equalization requirements specified in the Amendment.[58] On September 4, 1928, Chief Engineer J. H. Dellinger submitted a memorandum to engineers detailing the principles of the allocation plan. Three days later Dellinger issued a second engineering analysis of the plan. The second analysis, made by John V. L. Hogan a well known radio consulting engineer, supported Dellinger's engineering assertions. Hogan states, "I feel you and your Commissioners are to be congratulated upon having withstood criticism until this time when you are prepared to rearrange the broadcasters with the least possible disturbance of established services and the greatest improvement of the status of listeners, consistent with the law."[59]

Dellinger's memoranda and the supporting engineering opinions are significant for several reasons. First, they were meant to reassure those broadcasters who survived the earlier round of cuts that the status quo would be maintained as much as possible by providing a permanent, definite basis of station assignments for each zone and locality. Thus, any station that survived the license hearings of the past summer would find an allocation on the allotment table under General Order 40.[60] Secondly, Dellinger outlined a strategy for implementing 40 high powered stations on clear channels, a plan meant to bring greater listening choice to rural America while further entrenching the interests of the radio trust. Third, the plan placed several blocks of regional and local services on different parts of the dial to minimize inter-channel interference. This reallocation allowed larger metropolitan areas to have more station assignments. Finally by using the 'borrowing' clause of the Davis Amendment, some Commissioners hoped to keep licenses for stations in zones that were currently over quota by borrowing those frequencies from other states in the same zone that were under quota. This maneuver was meant to placate broadcasters and audiences in metropolitan areas who were used to having a diverse number of stations to choose from.[61]

While the plan implemented guidelines specified in the report of the Institute of Radio Engineers generally, General Order 40 specifically acknowledged the importance of meeting its political obligations as well adhering to the Commission's earlier decision that no existing stations would be abolished as a result of the new allocation. To reinforce the notion it was meeting its responsibilities as a regulatory arm of Congress, the FRC in its Second Annual Report specifically outlined the outcome of license reductions as part of its attempt to meet the requirements of the Davis Amendment. Documents of the Commission show that this strategy was developed in August before the actual announcement of General Order 40.[62]

In implementing the equalization plan, the FRC needed to meet specific regulatory requirements in the Act allowing stations an opportunity to appeal the frequency assignment change if they were displeased by their new frequency. Such a move would reduce litigation and possible court challenges to the allocation scheme. The Commission stated it would give stations an opportunity to examine the new assignments and challenge the potential changes, thus all station licenses were extended until November 11,1928. The details of the plan were sent to broadcast licensees on September 11th. In that memorandum, Acting Chairman Sykes tried to assure broadcasters that the Order was a starting point, not a final solution. "(I)t is the desire of the Commission that any broadcasting station which is dissatisfied with its assignment under the reallocation should have an opportunity to be heard and to demonstrate that public interest, convenience or necessity would be served by a better assignment," he notes.[63] In addition to proffering good will for the new plan and hoping to head off a court challenge, the Commission wanted to examine the effects of the reallocation which up to this point were only theorized on paper. A second temporary licensing period was established to allow the engineering staff time to fix unforeseen problems after the stations moved to their new frequency assignment. [64]

The Commission used several strategies to disseminate positive information about the equalization plan to the general public. For example, the October issue of *Congressional Digest* was given over entirely to a discussion of the problems of radio reallocation. On the day of the reallocation, Commissioner Orestes Caldwell issued a lengthy statement to the public stressing several previously mentioned points that: 1) engineering experts created the plan, 2) small town and remote listeners would benefit greatly, 3) dissatisfied broadcasters could challenge the assignment, and 4) some time would be required to evaluate the effects of the change.[65] At the same time, Dellinger issued a press release attempting to explain the benefits of the plan to both general and technically sophisticated readers. In the New York *Herald Tribune*, Dellinger suggested that listeners would find it helpful to make lists of the old and new dial assignments side-by-side for easy comparison while in the *Journal of the Institute for Radio Engineers* he analyzed the allocation scheme for the technically minded.[66]

Outwardly the Commission appeared pleased with the response to reallocation although almost immediately following the announcement of General Order 40, numerous complaints were filed with the Commission. Boasting about the benefits of the new allocation scheme under General Order 40, Commissioner O. H. Caldwell stated: "Congress handed us a lemon and we have proceeded to make lemonade out of it."[67] Immediately following the issuance of the Commission's reallocation scheme, broadcasting stations began to protest the plan. Many complained that the plan did not constitute an equalization as required by the Davis Amendment. The Commission had to set several hundred cases for hearing. Meanwhile political pressure mounted in Congress at the same time as various interest groups expressed displeasure with General Order 40. On November 22, 1928, a resolution passed requiring the FRC to report back to the Senate on or before December 15, 1929 detailing the number of licenses, power allocations, number of frequencies, and periods of time for operation among all five zones.[68]

V. After Equalization: Analysis of the Commission's Choices

Analysis of the implementation of General Order 40 poses several problems for broadcast historians, and legal, science or political policy analysts. Mark Gilderhaus reminds us that the historian displays a bias through the mere choice of subject matter and Carl Becker observes that since the actual past is gone, the world of historical analysis is an intangible world.[69] What the historian chooses reflects what she/he thinks is important. Yet, public interest theory, the basis upon which we provide assessment of regulatory success or failure, is predicated precisely on those fault lines, e.g. on interpretive views of the events, legislative histories, the people circumscribing the agencies, and the specific laws analyzed during specific time periods. Robert Brett Horwitz notes that within this perspective, the public interest is assessed as either a theoretical standard or as a historical fact of the regulatory agency's birth.[70]

The Federal Radio Commission's birth was a difficult one. It was the result of rancorous debate, inadequate funding, and political manipulation. The Commission was created to deal with immediate and long-term structural

problems. Thus, given the circumstances of the Commission's birth, the amazing growth of radio as a means of communication and as a social institution, and the powerful lobbying interests of the radio trust and the NAB, the implementation of the Davis Amendment provides significant material to analyze. Several different theoretical frameworks provide potential for conceptualizing the importance of the events, for analyzing their long-term significance, and for explaining the behavior of the regulating agency.[71] Public interest theory provides us with the opportunity to view the events surrounding the implementation of the Davis Amendment as one of the resolution between the conflict of the needs of private corporations and the needs of the general public. We could deduce this based on the above stated history surrounding the passage of the Davis Amendment.

While applying public interest theory would allow the reader a historical understanding of those events, the application of such an analysis fails to provide a richness of detail in defining the various influences played upon the commission. For example, the growth of the radio industry during this period seems to fail to conform to the mold of the small, individual producer as embodied in the Jeffersonian idealism of public interest theory. During this time, radio was largely controlled by large industrialized companies such as RCA, Westinghouse, AT&T and General Electric.

The application of the 'progressive' phase of public interest theory reflects the altered economic conditions created by large corporations, situations not unlike the growth of radio during the period leading up to the formation of the FRC, but the technical interference problems and the 'equalization' requirements of the Davis Amendment effectively remove this means of analysis as a viable explanation for the promulgation of regulatory policy as embodied in General Order 40. On the face of it, the specific actions of the FRC generally seem to support the large radio interests as opposed to reflecting the work of an interventionist-type commission designed to protect powerless consumers.[72] Thus, the FRC does not seem to act like the Federal Trade Commission. or other similar regulatory agencies.

In "Four Systems of Policy, Politics and Choice," Theodore J. Lowi defines a model of capture theory that details likely policy outcomes based on the influences and types of coercion applied in given circumstances. This kind of analysis is useful because it allows one to look at the behavior of the actors and apply a schema to explain the events or outcomes as a result of the application of coercion, policy directives and/ or politics upon the regulating body. Figure 1.0 describes the four potential policies (and their political effects) that could be adopted by an independent commission such as the Federal Radio Commission as a result of the various potential influences. Under such a schema, if you looked at the policy it would be possible to guage the immediate influences upon that policy or upon trying to change that policy. For instance distributive policy would be likely to influence individual conduct as opposed the the environment of conduct throughout a whole segment of an industry or industrial sector.

TYPES OF COERCION, TYPES OF POLICY, AND TYPES OF POLITICS

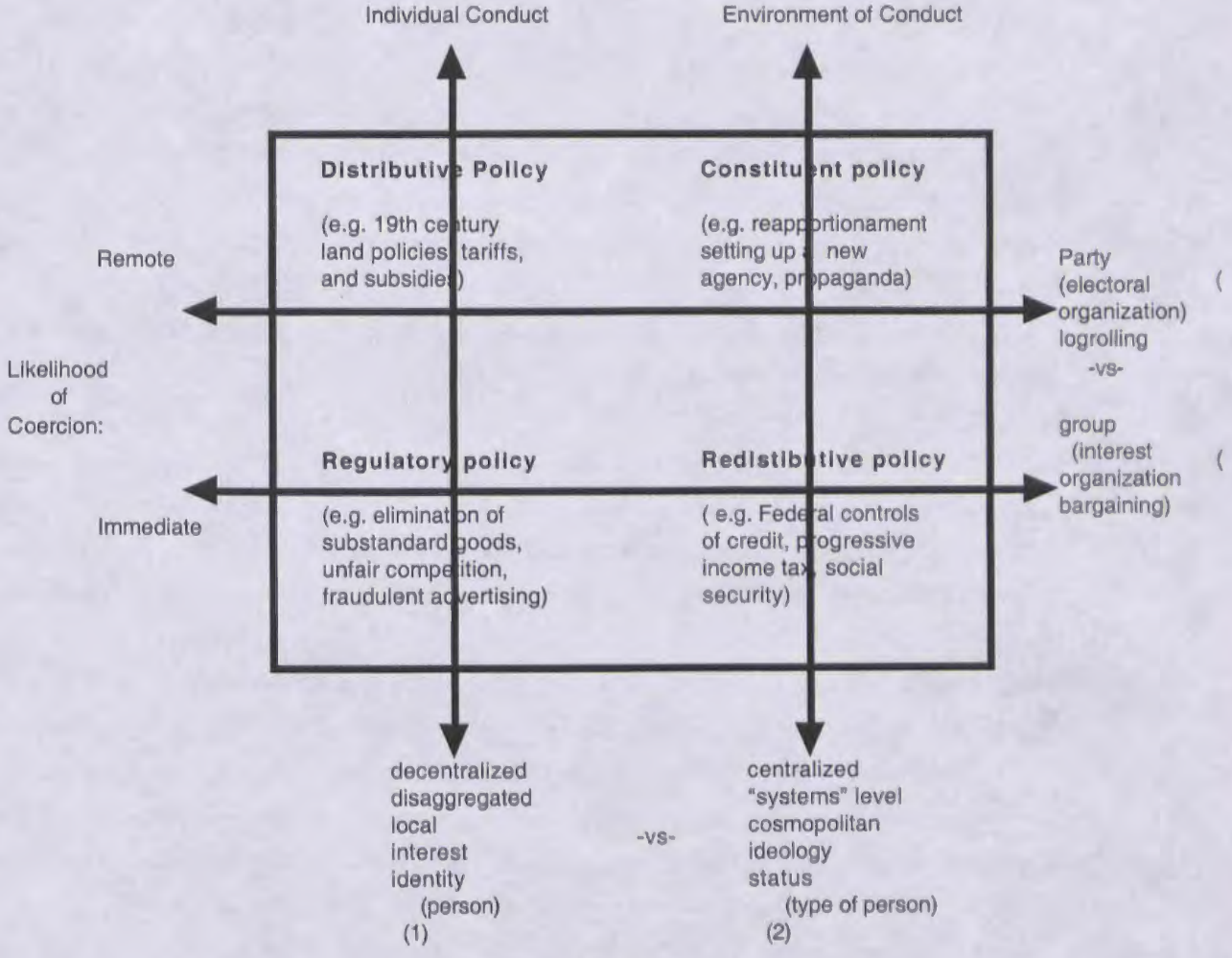


fig. 1.0[73]

To apply this schema to the Federal Radio Commission, one could analyze the nature of radio licensing and assess its potential benefit to the licensee. After doing so, it is possible to deduce the type of policies being applied to the broadcasting industry. For example, one could analyze the effects of the application of federal policy with the onset of radio licensing starting about 1912. The Wireless Act of 1912 provided for little regulatory oversight. Licensing was primarily a record keeping function assigned to the Commerce Department. As can be seen in figure 1.0, early licensing would be considered 'Distributive'. In this case government is giving away (or licensing) a property right. The determinations made for a distributive policy type generally depends on individual conduct (e.g. is the applicant a suitable license holder?). One would conclude that the likelihood of coercion upon the policymaker, the giver of the license, is as remote as the likelihood of coercion by the government upon the licensee. Since the Secretary of Commerce essentially granted radio licenses when the individual or party applied for one, we can see

that in real life little coercion would have been applied. Why? Because no test was required for licensing and the license was not a limited resource in 1912, little coercion would occur.

Using this schema to look at changes in the types of policy illustrates that the Federal Radio Commission actions do not fall into the regulatory policy arena as easily as do other governmental agencies policies such as the Federal Trade Commission or the Interstate Commerce Commission. Both the FTC and ICC were created to use 'regulatory policy' to eliminate unfair practices or reduce the problematic of poorly made or unsafe goods. Clearly the FTC could apply coercion to firms through the use of 'cease and desist orders' and 'consent degrees'. Similarly, the trust-busting ability of the FTC could move to decentralize and disaggregate large trusts.[74] Applying Lowi's schema illustrates the fact that there is a great likelihood of pressure or coercion applied to the regulatory agency when large trusts attempt to maintain the status quo.

The plight of the Radio Commission appears somewhat different from traditional regulatory agencies, though, when we attempt to plot the influences on it within this schema. The 1927 Federal Radio Commission found itself in a different situation than the Secretary of Commerce did in 1912. For example, if the FRC attempted to use 'Regulatory' policy to break up the increasingly powerful radio trust, it was likely to face the threat of immediate coercion from considerable lobby efforts of the powerful corporations involved in the radio trust. Worse yet, because the FRC was not a permanently established independent regulatory commission, it found itself heavily influenced by various 'Constituent' policy initiatives of Congress because it faced a yearly renewal. Many in Congress were looking for the FRC to reapportion frequencies favorable to them; a bit of redistributive policy with a constituent interest bent. Conversely other members of Congress from the East and Midwest looked to maintaining the status quo. Still others looked for the agency to develop policies that would permit local stations to transmit without the interference problems that plagued radio after 1926. There appeared to be no clear cut constituent decision that would please the majority of Congress possible for the Commission to adopt. And, educational leaders were interested in having the FRC develop redistributive policies that would create the necessary conditions for the long-term growth of radio for educational and informational purposes. Other special interest groups wanted to affect policy, too. Commercial interests wanted to maintain the current system of broadcasting ensuring the growth of powerful radio networks.

The divergent set of interests provided too many countervailing pressures on the infant, unstable Federal Radio Commission. As noted earlier, it was necessary for the Commission to respond to party pressures and interest group pressures of various Congressional constituents, mindful that Congress had (1) failed to confirm several commissioners who were friendly to Hoover, (2) failed to provide funds for the agency's operation, and (3) anticipated that the commission would expire at the end of its term of appointment. A look at figure 1.1 illustrates some potential policy outcomes that might occur as a result of choosing specific goals or favoring the influences of certain politics.

TYPES OF COERCION, TYPES OF POLICY, AND TYPES OF POLITICS

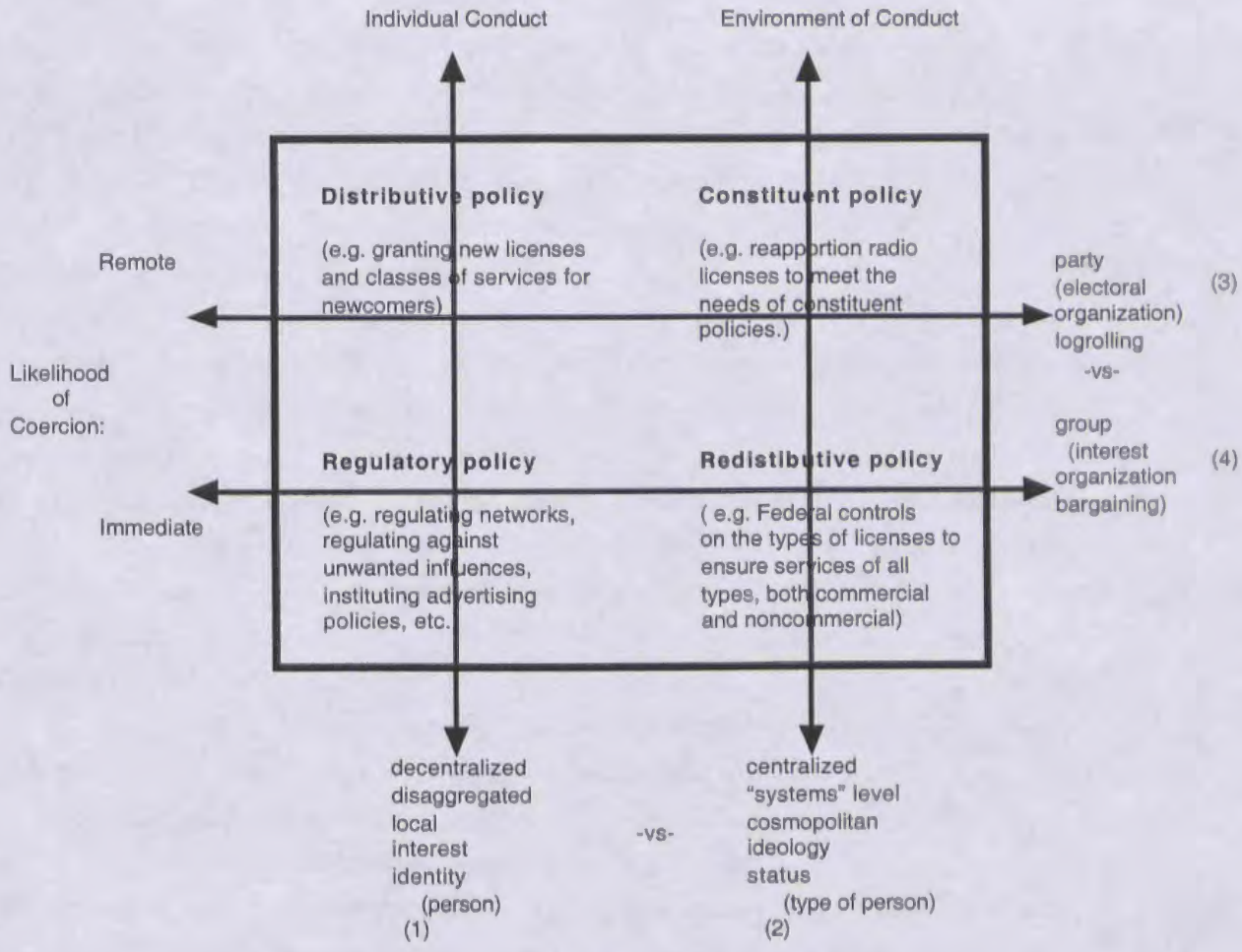


fig. 1.1

Within the framework of this redrawn policy schema one can conclude that the Federal Radio Commission of 1927 is caught between several different factions. The traditional congressional needs versus special interests needs are obvious. On one hand some congressional members, such as Ewin Davis from the South, are applying constituent coercion on the commissioners and would like to see the Commission equalize the number of radio licenses between the northern U. S. cities and southern cities. The pressures put on the Commission by the congressional membership follows traditional logrolling behavior. Adoption of the Davis Amendment's equalization language requires the FRC to act to meet the regional needs of the South and the West. Other congressmen, such as Congressman Dill, wanted the Commission to redistribute the radio spectrum for special interests such as alternative and educational users. One can see that different interests groups apply various forms of lobbying pressure would try to force the Commission to move in a specific direction on this chart. In choosing a political

solution, the Federal Radio Commission would be forced to favor one interest group at the expense of another regardless of the decision it chooses.

The FRC was faced with potential influences outside of Congress as well. The radio trust and some members of the NAB were at odds over potential regulatory policies for radio broadcasting. RCA, for example, was anxious to contain the application of FRC policy that could hamper the sales of radio receivers since it held the patents on the devices or circuits needed to build radios. Licensing fees as a means of paying for programs, such as those imposed by Great Britain, were seen as a deterrent to the sale of radio receivers. And by 1927, the members of the radio trust held the most powerful radio stations, developed chain broadcasting, and had the engineering expertise to improve these stations quickly and dramatically.[75] RCA opposed policies which disfavored large stations and its radio network. Obversely smaller broadcasters were afraid the of the potential and power of the RCA trust. These smaller National Association of Broadcasters members needed substantial revenues from advertising sales to build and expand their program offerings and broadcast facilities. These different factions attempted to coerce the FRC into adopting favorable policies to local or affiliated stations. While RCA would have favored a regulatory commission to ensure high engineering standards and the elimination of smaller nuisance stations, smaller NAB members would have favored a redistributive policy which required the delivery of programming at the local level.

The FRC tried to avoid upsetting the large station interests of the broadcasters and also tried to please the party or regional constituents' interests of Congress at the same time.[76] This strategy can be seen in the allocation scheme devised for General Order 40. The best channels favored large broadcast interests through the creation of 'clear channel' station allotments while the less powerful regional and local channel allotments could mollify many listeners concerned about their favorite local affiliated stations.[77] Given those countervailing forces, the strategy for implementing General Order 32 can be seen clearly. General Order 32 essentially reduced or eliminated marginal stations, including educational and special interest or 'propaganda' stations as the FRC referred to them. As a result of the FRC's general policies and the implementation of General Order 32, these stations found their power levels slashed and their hours of operation sharply curtailed. Clearly the actions of the commission are traced along the regulatory and redistributive trajectory; by reducing the influences of special interest groups such as educators and religious groups, the commission eliminated some of the complexity and pressure of resolving the equalization problem that faced them.

Lowi's taxonomy provides a useful way for using the historical record to assess the normative and empirical implications of radio regulation. This analysis contradicts the notion that implementation of the Davis Amendment would be best served using the very best engineering principles available. Looking at the outcomes, the implementation of the equalization principles becomes an amalgamation of both constituent and redistributive policies. For example, the intention to provide equalization of services to all regions of the country cuts across constituent boundaries, as previously noted in section 3 of this paper. However, Davis' criticism of the radio

commission for failing to reallocate power and frequency assignments of the large radio monopolies suggests the FRC should respond to Congress' desire to apply constituent policies while Dill's criticism that the FRC had not acted boldly enough suggests redistributive policies. Similarly Congress' refusal to confirm Commissioners Caldwell and Bellows suggests that members of Congress were uneasy with the close relationship between those two nominees and the powerful radio industry that was closely aligned with Herbert Hoover. These policy assumptions indicate normative policy goals Congress would have considered in voting the legislation for equalization up or down. However, along with normative assumptions were there Congressional concerns about formative outcomes, too? Did members of Congress assume that the likelihood of coercion on these Commissioners would be so great that they would do the bidding of the radio trust? Such a fear demonstrates one of the classic problems associated with the public interest capture theory.

In capture theory any institution with sufficient political influence will attempt to manipulate the policies of the agency. This may be too simplistic an explanation to understand the decisionmaking processes of the FRC. Any specific policy the FRC developed to help only one segment of the industry, say the large radio trusts, would meet the disapproval of those Congressmen who supported a different constituency, such as small, local stations. Again, Lowi's model provides illustrations of how external influences can be drawn along policy lines. The Federal Radio Commission was being pulled along ***several*** paths simultaneously. At the end of the first year, the influences upon the commission did not diminish. With the addition of specific equalization requirements in the Davis Amendment, the task that lay before the Commission was more complex politically and technically than ever. The Federal Radio Commission needed to develop an initiative that would free it from the constraints of developing a strategy for meeting the needs of just one of the four traditional sets of influences that are illustrated in figure 1.1. Instead, the Commission decided to focus on a technological solution to the administrative dilemma of having too many political interests clamoring for different policy solutions.

VI. General Order 40: Mixing Technology With Politics

Capture theory can be applied to scientific assessments as well as political influence peddling. Sheila Jasanoff states that bias in scientific assessment is commonly the result of conscious deception by 'experts' or of uncritical acceptance of the industry's viewpoint by agency officials.[78] Whatever regulations the Federal Radio Commission decided to effect regarding the interference problem, it was faced with the reality that broadcasting had established an important place in the social consciousness of America. McMahon notes that by the time Congress established the Commission in 1927, advertising had become the dominant mode of financing despite listener preferences for alternative ways to support radio programming.[79] Clearly the broadcasting networks had programming that the public wanted to listen to, and two members of the Commission had industry ties. But, it is the recommendations of the Institute of Radio Engineers that essentially assured the continuance of the large broadcasters by setting up the allocation scheme of several large, powerful clear channel stations in each zone of the country. In many cases

these large stations were already owned or affiliated with the broadcasting networks, either NBC or the newly formed Columbia Broadcasting System.

The decisionmaking process, at first blush, was seemingly based on engineering principles, but it appears to be influenced by political and economic decisions, as well as engineering requirements. For example, during the first years of the FRC, Alfred Goldsmith was both president of the Institute of Radio Engineers and the chief broadcast engineer of RCA. Thus, the recommendations of the radio engineers presented to the Commission must have reflected, at least to some degree, the beliefs of how to best deal with the interference problem from the perspective of the special committee and RCA's chief engineer.[80] Other members of the IRE committee set up to study the implementation of the Davis Amendment included C. W. Horn of Westinghouse Electric, R. H. Marriot of International News Corp., and L. E. Whittemore of the Bureau of Standards.

Several members of the Commission spoke against the acceptance of the recommendations of the engineers. On August 17, 1928, Louis Caldwell, General Counsel, notes in a memorandum to the Commissioners,[81]

> 3 a. The small stations are <u>not</u> being treated well under the proposed reallocation: it is foolish to think that they will be fooled into believing the contrary....
>
> 5. One manifest injustice in the proposed reallocation is the fact that on the whole all the so-called trust stations receive the very best treatment (in some cases the same corporation preserves two or three full-time assignments on the best channels) while the big independent stations in the Middle West are forced to divide time.
>
> 7. As a matter of fact, even the proposed reallocation does not come anywhere near complying with the Davis Amendment, under the heading of equality in number of stations.

Also taking issue with the engineers' report, Commissioner Sam Pickard, of Zone 4, wrote, "I feel it is unfortunate that my views on that subject (using the borrowing clause under equalization) are not shared by a majority of the Commission.... My apprehension is that the present effort to approach the ideal.... abruptly limits the facilities of this zone to a margin where stations, previously recognized as rendering worth while service by this Commission, cannot exist. "[82]

Representative Ewin Davis, author of the amendment, also took exception to the engineers' allocation scheme writing, "....even from the standpoint of getting the National Broadcasting Company chain programs to the various sections of the country, there is no occasion for granting to such stations a monopoly of power or desirable and cleared channels, not to speak of the fact that such an allocation would deprive stations broadcasting independent programs of the share to which they are entitled..."[83]

Even after adoption of the allocation scheme various influential people spoke out about the adoption of a commercially based systems as mapped out by the IRE and adopted by the Commission. Speaking to the American Academy of Air Law in April, 1931, Bethuel Webster, Jr. former General Counsel to the Federal Radio Commission stated[84]:

> One may praise many of the performances of the National Broadcasting, the Columbia Broadcasting System, and originated by some of the chain and a few of the unaffiliated stations, and at the same time deprecate legislative policy and administrative weakness that permit the use of the ether under federal franchise for self-advertising stunts, for the sale of quack medicine, and the exposition of religious or social creeds in which the public generally has no interest.

Whether or not the recommendations of the Institute of Radio Engineers represented the very best solution to the equalization clause conundrum embodied in the Davis Amendment is open to interpretation. Many debated the implementation and the outcomes until the Commission finally abandoned enforcement of the Amendment in 1932. The final outcome, an allotment scheme that provided radio stations of varying powers to serve the United States worked substantially well until after the heyday of AM radio. What is at issue is whether the Federal Radio Commission exercised due diligence in accepting the policy recommendations of a body that was biased in favor of the industry that created it. One could argue that the FRC did not have the ability to proceed in such a technical task since it did not establish its own engineering department until after the recommendations of the Institute of Radio Engineers on August 17, 1928.[85] But that criticism would not reflect the reality that John Dellinger, who was chief engineer at the Bureau of Standards, oversaw the Commission's technical needs during the interim period and ultimately became the chief engineer for the Commission. While Dellinger's title changed, his work responsibilities did not.

Perhaps of greater importance are the questions that revolve around the way the Commission solicited and accepted scientific advice. Members of the scientific community use a variety of boundary-defining strategies to establish their authority and enhance their stature within scientific area and their professional circle. This behavior can be traced in the relatively new, rapidly expanding field of electrical engineering. Engineers of the Institute of Radio Engineers did this by building professional communities, defining and excluding nonmembers, competing for and asserting primacy of knowledge, and asserting their authority against those who held divergent opinions. For example, between 1915 and 1920 the Institute of Radio Engineers Board, under its secretary David Sarnoff, attempted to influence policymakers to keep radio in the hands of private capital. That effort continued as RCA's chief engineer Alfred Goldsmith succeeded Sarnoff as secretary and then as president of the IRE. McMahon states that IRE's pronouncements confidently stated that "government interference always impedes technological creativity. The Board's assertions left no room for exceptions."[86] Thus the IRE's policy pronouncements from 1915 through 1930 seemed to reinforce the agenda for corporate entities that ultimately became part of the RCA 'radio trust.'

During the 1930's historian Charles Beard notes[87]:

> Few indeed are the duties of government in this age which can be discharged with the mere equipment of historic morals and commonsense. Whenever, with respect to any significant matter, Congress legislates, the Court interprets, and the President executes, they must have something more than good intentions; they must command technical competence.

In this case, the building of a national broadcasting system really required significant regulation before the technical knowledge existed on how to best build it and how best to regulate it. Perhaps McMahon provides the best overview of the significance of the Institute of Radio Engineers' role in the technical decisionmaking process when he concludes that in addition to participating in the invention and development of radio, engineers made it feasible for corporate leaders to achieve vast organizational and physical systems. They shaped both the bureaucratic context in which they worked and, in part, the social uses of the technology they helped create.[88]

Does the analysis of the political and technological implications of the Davis Amendment hold significance and meaning for regulators and policymakers of today, particularly in areas where technology is rapidly changing the environment to be regulated? In *The Fifth Branch,* Jasanoff says the notion that the scientific component of decisionmaking can be separated from the political and entrusted to independent experts has been discredited. To prove useful, those making regulatory decisions need to be informed by an accurate knowledge of the internal dynamics of both science and regulation. She cautions that however rhetorically appealing it may be, no simple formula exists to allow for injecting expert opinion into public policy debate.[89] This caution should be inscribed for future communication policymakers to remember. Today, the pace of innovation of technology again calls to question the ability of regulators to make adequate decisions about which technologies hold promise for consumers and at what cost, what effects the implementation of new technology might be, and what impact these choices will have on current broadcast and telecommunications institutions.

Regulation restricts users' choice of activities and outcomes through the institutional consolidation of legislative, executive and judicial power in the single apparatus of independent commission. The mode of action can be informal through the companion use of consultative bodies, the adjudication is flexible on a case-by-case basis, and the rulemaking procedures can be formal defining the way participation in a proceeding will occur. Given the ability of the institution to set rules, the complex interaction of influences on the regulatory process and the flexible authority of the independent commission, scholars and consumers alike would be well advised to understand the contingent and socially constructed character of regulatory decisionmaking.

[1] Douglas, Susan J., Inventing American Broadcasting 1899-1922. Baltimore, MD: Johns Hopkins University Press. 1987. pp. xix.
[2] See Lowi, Theodore, *The End of Liberalism* (2nd. ed.). New York, NY: Norton. 1979. Also see Horwitz, Robert Britt, *The Irony of Regulatory Reform: The Deregulation of American Telecommunications,* New York, NY: Oxford University Press. 1989. pp. 31.
[3] Popper, Karl, "Prediction and Prophecy in the Social Sciences" in Patrick Gardiner (ed.) *Theories of History* . New York: The Free Press, 1959. pp. 276-85.
[4] McChesney, Robert W., *Telecommunications, Mass Media and Democracy: The Battle for the Control of U. S. Broadcasting, 1928-1935*, Oxford: Oxford University Press, 1993. pp. 18-21.
[5] See Sterling, Christopher H. and John M. Kittross, *Stay Tuned: A Concise History of American Broadcasting.* Belmont, Ca: Wadsworth Publishing Co. 1990. pp. 111.
[6] For example, Rosen looks at the beginning of radio broadcasting and its relationship to government over an expansive time period, covering the Federal Radio Commission's implementation of the Davis Amendment as a small part of the total work. Rosen, Philip T., *The Modern Stentors: Radio Broadcasting and the Federal Government, 1920-1934.*, Westport, Conn.: Greenwood Press, 1980. Louise Benjamin's wonderfully documented manuscript *Ariel's Covenant* (forthcoming) describes how the newly formed commission began and organized itself, and *Congressional Digest's* October 1928 edition takes on the Davis Amendment controversy by describing the problems involved in implementing the specific requirements of the amendment. *Congressional Digest*, Vol. 7. No. 10. October, 1928. pp. 255-286.
[7] Federal Radio Commission, *Annual Reports Number 1-7, 1927-1933*, Reprinted in *History of Broadcasting: Radio and Television*, Christopher Sterling, ed. Arno Press and the New York Times: New York, 1971. pp. 1
[8] See United States v. Zenith Radio Corporation, 12 Fed. (2nd series) 614.
[9] Lowi, Theodore J. "Four Systems of Policy, Politics, and Choice." *Public Administration Review*, Summer 1972. 299.
[10] Merrit, Dixon, "To Unscramble the Air." *The Outlook*, January 19, 1927. vol. 145. no. 3. pp. 75-76.
[11] It appears that Congress understood the problems involved in this area. See Committee on Interstate Commerce, Sixty-ninth Congress, Report 772, May 6, 1926. "If the channels of radio transmission were unlimited in number, the importance of the regulatory body would be greatly lessened, but these channels are limited and restricted in number and the decision as to who shall be permitted to use them and on what terms and for what periods of time...."
[12] McChesney supra note 4, at 16., On December 7, 1926 President Coolidge said, " .... the whole service of this most important public function has drifted into such chaos as seems likely, if not remedied, to destroy its (radio's) great value. I urgently recommend that this legislation should be speedily enacted." *Congressional Digest*, supra note 6, at 257.
[13] Public Act No. 632, 69th Congress, 2d session. entitled "An act for the regulation of radio communications". Evidently both of the original bills appeared to be flawed in granting the regulatory party sufficient control or power over the licensee. The ABA noted that neither "....deals adequately with the difficult problem of reducing interference" and that both bills ought to be amended 'so as to provide for closing up superfluous stations and for paying just compensation to them'." Air Law Committee, "Interim Report on Radio Legislation," *American Bar Association Journal*, Vol. 12. No 12. December, 1926. pp. 848. Merritt, Dixon, supra note 10. pp. 75-76.
[14] Public Act No. 632, 69th Congress, 2d session. The law created a five member panel appointed to overlapping six years terms. Each commissioner was to be responsible for a geographical 'zone' encompassing a large section of the country. However, the original authorization bill expired one year after passage. The Congress needed to reauthorize the Commission in 1928. In 1929, Congress extended the Commission indefinitely. See *Congressional Digest*, supra note 6, at 265.
[15] The commissioners included Rear Admiral W. H. G. Bullard for the second zone, Judge Eugene O. Sykes for the third zone, and Orestes H. Caldwell for the first zone. Neither Henry A. Bellows of Minneapolis for the fourth zone nor John F. Dillion for the fifth zone was not confirmed by Congress. Though Caldwell actively sought appointment, he was not confirmed by the 69th Congress. (*The Outlook* says that the objection to both Caldwell and Bellows, according to Dill, was they were seen to be under the influence of Hoover. See *The Outlook*, March 23, 1927. vol. 145. no. 12. pp. 356.) According to Barnouw, Caldwell decided to start work under his interim appointment, without salary, hoping to be confirmed in the next session of Congress. Barnouw, Erik, *A Tower in Babel: A History of Broadcasting in the United States, Volume 1 to 1933*, New York: Oxford University Press, 1966. pp. 213. Several other governmental agencies lent support to the orphaned commission. Loaned from the Department of Agriculture, Sam Pickard became the Commission's secretary. The Navy loaned the commission the services of Captain Stanford Hooper while the Department of Commerce lend the services of John H. Dellinger, chief of the Commerce's Radio Division. Benjamin, supra note 6, at Ch.. 6, pp. 2.

[16] Minutes of Discussion of the Federal Radio Commission, April 29,1927, NARG -173, Box 128, DOA - Executive Director, General Correspondence.
[17] McChessney, supra note 4, at 19.
[18] *General Order 11* issued at a meeting of the Federal Radio Commission, May 21, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. While it does not call for the elimination of any stations, the FRC clearly states that it believes that eliminate of interference can only be accomplished by reducing the number of broadcasting stations by 40%. The document also draws special attention to the fact that there are no unallocated frequencies from which to draw upon. Hence, the Commission indicates that it will be reassigning many stations to different frequencies.

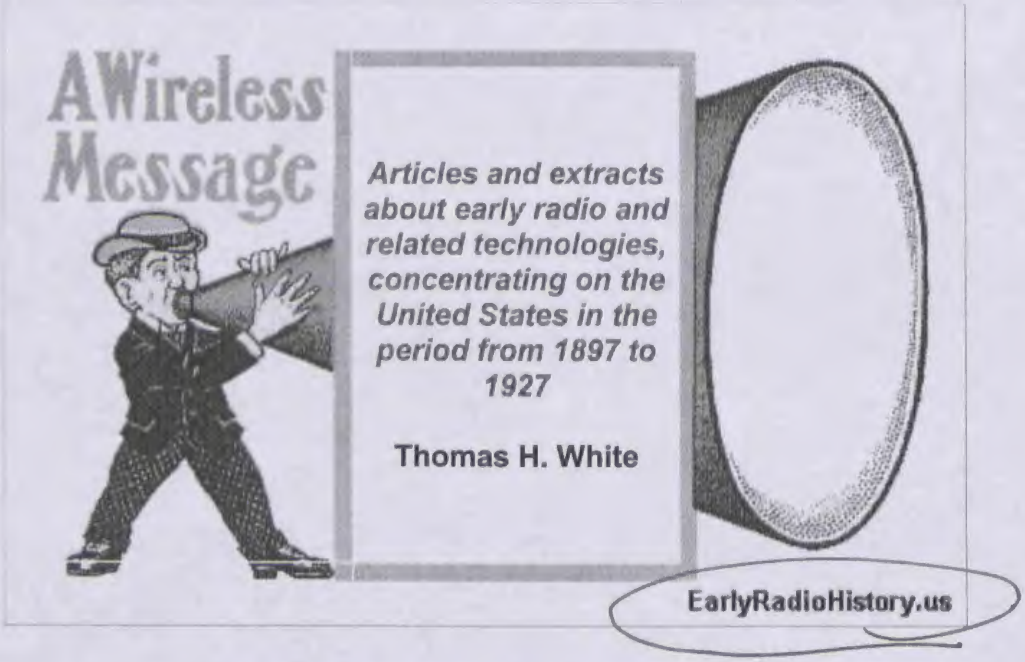
[19] Schmeckebier, Laurence F., *The Federal Radio Commission: Its History, Activities and Organization*, Service Monographs of the United States Government No. 65, The Brookings Institution: Washington, 1932. pp. 23.
[20] Federal Radio Commission, supra note 7 at 9. See the *Annual Report of the Federal Radio Commission.*
[21] See Minutes of the meeting of the Federal Radio Commission, June 7, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. General Order 19 issued by the Federal Radio Commission, November 14, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. Special Order 211 issued by the Federal Radio Commission effected the reassignment of many stations to help with the interference problem in rural areas. See Federal Radio Commission, Special Order 211, November 16, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[22] United States Congress, House of Representatives, Committee on the Merchant Marine and Fisheries, *Hearings on the Federal Radio Commission* , 70th Congress 1st session. January 26, 1928. pp. 3.
[23] This statement is not meant to suggest that the FRC had no plan or organizational conception of what it wanted to accomplish. For example, one of its first actions was to place all stations on even ten kilocycle spacing. Similarly, during the summer of 1927 the FRC separated stations in the same locality by at least five channels. Both of these techniques required some overarching plan. However, most problems were examined on a case-by-case basis. See "How the Federal Radio Commission Brought Order Out of Chaos" by Caldwell, Orestes, *Congressional Digest* supra note 6, pp. 266.
[24] See General Orders 10,11,12; Special Orders 5,6,7,8,9, Special Order 211. Federal Radio Commission supra note 5, NARG-173, Box 128, DOA-Executive Director , General Correspondence. See also Herring, J. M. "Equalization of Broadcasting Facilities Within the United States," *Harvard Business Review,* Vol. 9. no. 4, 1930. pp., 417- 430.
[25] "Urges Fixing Power of the Radio Board," *New York Times*, January 31, 1928. pp. 18.
[26] Rosen, Philip T. supra note 4. pp. 129. See also Schmeckebier, Laurence F. supra note 19. pp. 25. *Time Magazine* wrote that the large broadcast interests would be displeased with the actions of Congress during the reauthorization of the FRC because "(T)he effect may be to cut the franchises of the rich, long-established stations in New and Chicago zones to benefit the Southern and lower-Midwestern stations." "Radio: Opportunity for Service," *Time Magazine*, Vol. XI. no. 15, April 9, 1928. pp. ?????
[27] United States Congress, House of Representatives, Committee on the Merchant Marine and Fisheries, *Report on the Federal Radio Commission to accompany S. 2317., Report No. 800,* 70th Congress 1st session. February 29, 1928. pp. 2.
[28] Barnouw, supra note 15. pp. 215.
[29] Rosen, Philip T. supra note 6. pp. 129.
[30] United States Congress supra note 22. pp. 31.
[31] "Senate Demands Radio Bill Parley," *New York Times*, March 14, 1928. pp. 6-7. (??)
[32] "Radio Men to Fight Bill In Washington," *New York Times*, March 7, 1928. pp. 30.
[33] "Radio War Rages Around "Equal Division' Amendment." *New York Times,* March 4, 1928. pp. 19.; "Ides of March Loom as Day Approaches" *New York Times,* March 11, 1928. pp. 15.
[34] "Battle in Congress Opens on Radio Bill" *New York Times*, March 2, 1928, pp. 22.
[35] "Will the Davis Amendment Bring Better Radio?" *Congressional Digest* supra note 6. pp. 268.
[36] Minutes of the meeting of the Federal Radio Commission, February 17, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence. pp. 341, 343.
[37] *New York Times*, supra note 33. pp. 19. It should be noted that the *New York Times* was probably not an impartial observer. Since its main readership was New York City, the Times reflected the indignation that the city might lose some radio stations during a reallocation of the Davis Amendment. See "Radio Men Unmoved by Davis Measure," *New York Times,* March 3, 1928. pp. 10.
[38] After a prolonged debate the bill passed 235 to 135. The vote was split along geographical lines with the majority of the opposition from the heavily populated states of the East and Midwest. See Schmeckebier, Laurence F. supra note 19. pp. 28.

[39] 45 Stat. L., 373. section 9.
[40] Rosen, supra note 6. pp. 130.
[41] *Congressional Digest*, supra note 6. pp. 262.
[42] Federal Radio Commission, supra note 7. pp. 12.
[43] id
[44] "Report of Radio Engineers to the Federal Radio Commission," *Journal of the Institute of Electrical Engineers,* Vol. 17 ???? pp. 556. See also Press Release of the Federal Radio Commission (hereinafter Press Release), April 11, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence. By contrast, when the FRC came into being in 1927, it used the same techniques that the Secretary of Commerce had used in the National Radio Conference of the 1920s. Then the Commission asks broadcasters for input to a possible solution to the interference problem. See Federal Radio Commission, supra note 7. at 3. Most of the input reflected commercial interests. See also McChesney, supra note 4. at 19.
[45] See Minutes of the meeting of the Federal Radio Commission, April 11, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[46] At one oversight hearing, Chairman Ira Robinson complained of 'political pressure constantly exercised...in all manner of cases' by members of Congress. See Schmeckebier, Laurence F. supra note 10 at 57. This pressure, coupled with Congress' passage of the one-year term clause in the 1928 reauthorization certainly illustrated the coercive potential of the legislature on the independent body. See Barnouw, Erik supra note 15 at pp. 217.
[47] Press Release, supra 41.
[48] Federal Radio Commission, supra note 7. Appendix 'E' pp. 142- 150. J. H. Dellinger attempted to discredit the plan submitted by the National Association of Broadcasters because it strayed too far from engineering considerations. In writing an analysis of the broadcasters' plan Dellinger wrote, "Several speakers at the hearing emphasized that engineering considerations are not the only ones involved, and that other matters, financial problems, local conditions, etc. make some of the engineering recommendations impracticable. While it is true that the problem of broadcast allocation is too complex to be solved by straight engineering calculation, nevertheless its solution can not be right if it disregards any valid engineering principle."
[49] *New York Times*, "Radio Allies Offer Allocation Plan," April 23, 1928. pp. 18.
[50] Federal Radio Commission supra note 7. Appendix "E", "Summary of the conference of engineers on April 6, 1928, by J. H. Dellinger" at 133. Dellinger states " (S)ince the law requires equality of the number of hours and licenses among the zones, and, according to population, among the States within each zone, if time is divided on a given channel among several stations in any one State, this division must be duplicated on some channel in every other zone and proportionally in every State."
[51] Increasing the number of stations as a political expedient would have required the FRC to rescinding General Orders 92 and 102 which set forth the method by which equalization would be brought about. General Order 102 prohibited the FRC from allocating more stations to zones that already used its pro-rated share of facilities.
[52] Federal Radio Commission supra note 7 at 150.
[53] While Commissioner La Fount moved for the adoption of the basic principles of the Engineer's Plan on July 24, this was really a formality since the Commission had been working on the basic plan since April. Lafount, Harold A., Memorandum, July 24, 1928" NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[54] Federal Radio Commission supra note 7 at 163.
[55] Slotten, Hugh Richard, "Creating "Radio Paradise": Radio Engineers, the Federal Radio Commission, and Technological Systems"(Unpublished manuscript). p. 21-22.
[56] During this period and through the fall, Commission members sought public support for the engineers' report. For example, on a tour of Western states, Fifth Zone Commissioner Harold LaFount supported the clear channel concept by stating: "We hear a lot about freakish characteristics of radio, but we know enough about it to realize that one station on a channel produces the desired results." See "West unworried over new waves," *New York Times*, May 6, 1928. xx. pp. 21.
[57] Herring, J. M., "Equalization of Broadcasting Facilities Within the United States," *Harvard Business Review*, vol. 9, No. 4. 1930. 423.
[58] Four Commissions supported the plan. Ira Robinson, as noted earlier, voted against the Order believing that the Davis Amendment did not require immediate action.

[59] "Radio Engineer Analyzes New Broadcasting-Allocation Plan," NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[60] Memorandum to Broadcasting Committee, NARG-173, Box 128, DOA-Executive Director, General Correspondence. General Order 40 issued August 30, 1928 by the Federal Radio Commission, August 30, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[61] Memorandum 180 "To All Persons Holding Licenses to Broadcast" Federal Radio Commission, September 11, 1928. NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[62] Memorandum to Eugene O. Sykes from G. Franklin Wisner, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[63] Id.
[64] Caldwell, O. H. "How the Federal Radio Commission Brought Order Out of Chaos" from *Congressional Digest* supra note 6 at 266.
[65] Orestes H. Caldwell, "Why the broadcasting reallocation was made," NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[66] Dellinger, J. H., "The New Dial Settings:" NARG-173, Box 128, DOA-Executive Director, General Correspondence. Dellinger, J. H. "Analysis of Broadcasting Station Allocation," *Journal of the Institute of Radio Engineers*. Vol. 16. no. 11. Nov., 1928. pp. 1477-1485.
[67] Caldwell, Louis G. "The Standard of Public Interest, Convenience or necessity as used in the Radio Act of 1927," *Air Law Review*, Vol. 2, No. 3. July, 1930. pp. 326.
[68] Herring, J. M. supra note 22 at 422.
[69] Gilderhaus, Mark T. *History and Historians: A Historical Introduction, 2nd ed.*, Englewood Cliffs, N.J.: Prentice Hall, 1995. pp. 80.
[70] Horwitz, Robert Brett, *The Irony of Regulatory Reform: The Deregulation of American Telecommunications.* New York, NY: Oxford University Press, 1989. pp. 27.
[71] Id. pp. 22. Horwitz provides an outstanding discussion of the different theories of regulation and their specific weaknesses and strengths.
[72] Id. pp. 121.
[73] See Lowi, Theodore J. supra note 9 for a complete discussion of this schema.
[74] Jome, Hiram L., *Economics of the Radio Industry*, Chicago: A. W. Shaw & Co., reprinted by the Arno Press, New York, 1971. pp. 53. The formation of the radio trust and the creation of RCA occurred largely because of government intervention so as to making the licensing of technology easier.
[75] McMahon, A. Michal, *The Making of a Profession: A Century of Electrical Engineering in America*, New York: Institute of Electrical and Electronics Engineers Press. 1984. pp. 163. See also Jome, supra note 74. pp. 251.
[76] During the spring of 1928, the FRC quickly approved power increases and frequency changes for stations in the southern zone but withheld changes in allocation or allotment for stations in the East and Midwest. See NARG-173, Box 128, DOA-Executive Director, General Correspondence. FRC minutes April 11, 1928.
[77] See a "Memorandum to Mr. Caldwell" which states: "(A)ll the present high-powered stations are backed by large electric or radio interests and were established early in 1921 or 1922. At that time these were practically the only organizations that saw the possibilities of high-powered broadcasting, had the engineering backing and financial ability to undertake such station construction." Butman, Carl, H., Secretary, Federal Radio Commission. NARG-167, Box 7, General Records of J. H. Dellinger. February 2, 1928.
[78] Jasanoff, Sheila, *The Fifth Branch: Science Advisers as Policymakers*, Cambridge: Harvard University Press. 1990. pp. 15.
[79] McMahon, A. Michal, Supra note 75. p. 163. Jome notes the probability that indirect advertising will support stations in 1926. Supra note 74. pp. 246.
[80] McMahon notes that the FRC and the IRE were so close during these early years that two of the five commissioners served as IRE Board members, too. Supra note 75. p. 164.
[81] Caldwell, Louis G. NARG-167, Box 87, General Records of J. H. Dellinger. August 17, 1928.
[82] Pickard, Sam. NARG-167, Box 87, General Records of J. H. Dellinger. August 31, 1928.
[83] Davis, Ewin, letter to the Federal Radio Commission, Federal Radio Commission, *Annual Reports Number 1-7, 1927-1933*, Reprinted in *History of Broadcasting: Radio and Television*, Supra note 7. pp. 134.
[84] Webster, Jr. Bethuel M. "Our Stake In the Ether," address to The American Academy of Air Law and The School of Law, New York University. April 10, 1931. pp. 9.

[85] Dellinger, J. H. NARG-167, Box 87, General Records of J. H. Dellinger. August 17, 1928.
[86] McMahon, Michal A., Supra note 75. pp. 152.
[87] Beard, Charles A. *The American Leviathan: The Republic in the Machine Age*. New York: Oxford University Press, 1941. pp. 297
[88] McMahon, Michal, A. Supra note 75. pp. 157.
[89] Jasanoff, Shiela. Supra note 78. pp. 17.

UNITED STATES EARLY RADIO HISTORY



LATEST ADDITIONS (May 15, 2004)

- Six additions in Radio at Sea, plus an 1920 review by Lee DeForest promoting amateur radio in Amateur Radio After World War One.

An assortment of highlights -- plus a few lowlifes -- about early U.S. radio history. Over time more articles will be added, to cover additional topics and expand on the existing ones. (This webpage was begun September 30, 1996, and was located at www.ipass.net/~whitetho/index.html until March 11, 2003).

Sections

1. Period Overview (1896-1927) - General reviews of the individuals, activities and technical advances which characterized this era.

2. The Electric Telegraph (1860-1914) - The electric telegraph revolutionized long-distance communication, replacing earlier semaphore communication lines. In addition to its primary use for point-to-point messages, other applications were developed, including printing telegraphs ("tickers") used for distributing stock quotes and news reports.

3. News and Entertainment by Telephone (1876-1925) - While the telegraph was mainly limited to transmitting Morse Code and printed messages, the invention of the telephone made distant audio communication possible. Although used mostly for private conversations, there was also significant experimentation with providing home entertainment. In 1893 a particularly sophisticated system, the *Telefon Hirmondó*, began operation in Budapest, Hungary -- one of its off-shoots, the *Telephone Herald* of Newark, New Jersey, did not meet with the same financial success.

4. Personal Communication by Wireless (1879-1922) - After Heinrich Hertz demonstrated the existence of radio waves, some were enchanted by the idea that this remarkable scientific advance could be used for personal, mobile communication. But it would take decades before the technology would catch up with the idea.

5. Radio at Sea (1891-1916) - The first major use of radio was for navigation, where it greatly reduced the isolation of ships, saving thousands of lives, even though for the first couple of decades radio was generally limited to Morse Code transmissions. In particular, the 1912 sinking of the Titanic highlighted the value of radio to ocean vessels.

6. Early Radio Industry Development (1897-1914) - As with most innovations, radio began with a series of incremental scientific discoveries and technical refinements, which eventually led to the development of commercial applications. But profits were slow in coming, and for many years the largest U.S. radio firms were better known for their fraudulent stock selling practices than for their financial viability.

7. Pioneering U.S. Radio Activities (1897-1917) - Marconi's demonstration of a practical system for generating and receiving long-range radio signals sparked interest worldwide. It also resulted in numerous competing experimenters and companies throughout the industrialized world, including a number of important figures in the U.S., led by Reginald Fessenden and Lee DeForest.

8. Alternator-Transmitter Development (1891-1920) - Radio signals were originally produced by spark transmitters, which were noisy and inefficient. So experimenters worked to develop "continuous-wave" -- also known as "undamped" -- transmitters, whose signals went out on a single frequency, and which could also transmit full-audio signals. One approach used to generate continuous-wave signals was high-speed electrical alternators. By 1919, international control of the Alexanderson alternator-transmitter was considered so important that it triggered the formation of the Radio Corporation of America.

9. Arc-Transmitter Development (1904-1921) - A more compact -- although not quite as refined -- method for generating continuous-wave radio signals was the arc-transmitter, initially developed by Danish inventor Valdemar Poulsen. Because arc-transmitters were less complicated than alternator-transmitters, a majority of the early experimental audio transmissions would use this device.

10. Audion and Vacuum-tube Receiver Development (1907-1916) - Lee DeForest invented a three-element vacuum-tube detector which he called an Audion, but initially it was so crude and unreliable that it was little more than a curiosity. After a lull of a few years, more capable scientists and engineers, led by AT&T's Dr. Harold Arnold, improved vacuum-tubes into robust and powerful amplifiers, which would revolutionize radio reception.

11. Pre-War Vacuum-tube Transmitter Development (1914-1917) - AT&T initially developed vacuum-tubes as amplifiers for long-distance telephone lines. However, this was only the beginning of the device's versatility, as various scientists and inventors would develop numerous innovations, including efficient continuous-wave transmitters, which would eventually replace the earlier spark, arc, and alternator varieties.

12. Pioneering Amateurs (1900-1917) - Radio captured the imagination of thousands of ordinary persons who wanted to experiment with this amazing new technology. Until late 1912 there was no licencing or regulation of radio transmitters in the United States, so amateurs -- known informally as "hams" -- were free to set up stations wherever they wished. But with the adoption of licencing, amateur operators faced a crisis, as most were now restricted to transmitting on a wavelength of 200 meters (1500 kilohertz), which had a limited sending

range. They successfully organized to overcome this limitation, only to face a second hurdle in April, 1917, when the U.S. government shut down all amateur stations, as the country entered World War One.

13. Radio During World War One (1914-1919) - Civilian radio activities were suspended during the war, as the radio industry was taken over by the government. Numerous military applications were developed, including direct communication with airplanes. The war also exposed thousands of service personnel to the on-going advances in radio technology, and even saw a few experiments with broadcasting entertainment to the troops.

14. Expanded Audion and Vacuum-tube Development (1917-1924) - The wartime consolidation of the radio industry under government control led to important advances in radio equipment engineering and manufacturing, especially vacuum-tube technology. Still, some would look toward the day when vacuum-tubes would be supplanted by something more efficient and compact, although this was another development which would take decades to be realized.

15. Amateur Radio After World War One (1919-1924) - Although there was concern that amateur radio stations would not be allowed to return to the airwaves after the war, in 1919 the wartime restrictions were ended. And the next few years would see tremendous strides, as amateurs adopted vacuum-tube technology and began to explore transmitting on shortwave frequencies, which resulted in significant increases in range and reliability.

16. Broadcasting After World War One (1918-1921) - Although still unfocused, scattered broadcasting activities, taking advantage of the improvements in vacuum-tube equipment, expanded when the radio industry returned to civilian control.

17. Big Business and Radio (1915-1922) - Once the radio industry finally became profitable,. major corporations -- including the American Telephone & Telegraph Company, General Electric, and Westinghouse -- moved into the field. Meanwhile, in 1919, due to pressure from the U.S. government, American Marconi's assets were sold to General Electric, which used them to form the Radio Corporation of America.

18. Broadcasting Becomes Widespread (1922-1923) - Led by Westinghouse's 1920 and 1921 establishment of four well-financed stations -- located in or near Pittsburgh, Boston, Chicago and New York City -- there was a growing sense of excitement as broadcasting activities became more organized. In December, 1921, the Department of Commerce issued regulations formally establishing a broadcast service. Then, in early 1922, a "broadcasting boom" occurred, as a sometimes chaotic mix of stations, sponsored by a wide range of businesses, organizations and individuals, sprang up, numbering over 500 by the end of the year.

19. The Development of Radio Networks (1919-1926) - The introduction of vacuum-tube amplification for telephone lines allowed AT&T to experiment with sending speeches to distant audiences that listened over loudspeakers. The next step would be to use the lines to interconnect radio stations, and in December, 1921 a memo written by two AT&T engineers, J. F. Bratney and H. C. Lauderback, outlined the establishment of a national radio network, financially supported by advertising. General Electric, Westinghouse and RCA responded by forming their own radio network, however, unable to match AT&T's progress, in 1926 they bought out AT&T's network operations, which were reorganized to form the National Broadcasting Company.

20. Financing Radio Broadcasting (1898-1927) - Soon after Marconi's groundbreaking demonstrations, there was speculation about using radio signals to transmit information to paying customers. However, there was no practical way to limit broadcasts to specific

receivers, so for a couple decades broadcasting activities were largely limited to experiments plus a limited amount of public service transmissions by government stations. During the "broadcasting boom" of 1922, most programming was commercial-free, and entertainers, caught up in the excitement of this revolutionary new invention, performed for free. Meanwhile, a few people wondered how to pay for all this. In early 1922, AT&T began promoting the controversial idea of using advertising to finance programming. Initially AT&T claimed its patent rights gave it a monopoly over radio advertising, but in a 1923 industry settlement paved the way for other stations to begin to sell time. And eventually advertising-supported private stations became the standard for U.S. broadcasting stations.

21. Fakes, Frauds, and Cranks (1866-1922) - Unfortunately, some "misunderstood geniuses" are actually crazy, or dishonest, or both.

22. Word Origins - Reviews of the history of the words "radio" and "broadcast".

23. Early Government Regulation (1903-1946) - Documents covering early international and national control of radio.
    - 1903 Berlin Conference
    - 1904 "Roosevelt Board"
    - 1906 Berlin Convention
    - 1910 Ship Act (Amended in 1912)
    - 1912 London Convention and 1912 Radio Act
    - Selected Radio Service Bulletin Announcements (1915-1923)
    - Early Government Station Lists (1906-1946)
    - Radio Regulation by the Department of Commerce (1911-1925)

24. Original Articles - Writings about United States radio history, emphasizing the early AM broadcast band (mediumwave).
    - Mystique of the Three-Letter Callsigns
    - Three-Letter Roll Call
    - K/W Call Letters in the United States
    - United States Callsign Policies
    - U.S. Special Land Stations: Overview
    - U.S. Special Land Stations: 1913-1921 Recap
    - Building the Broadcast Band
    - United States Pioneer Broadcast Service Stations
    - U.S. Pioneer Broadcast Service Stations: Actions Through June, 1922
    - United States Temporary Broadcast Station Grants: 1922-1928
    - Early Commerce Department Records: Examples
    - Kilohertz-to-Meters Conversion Charts
    - Washington D.C. AM Station History
    - Extraterrestrial DX Circa 1924: "Will We Talk to Mars in August?"
    - The International Radio Week Tests
    - "Battle of the Century": The WJY Story

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David Sarnoff, 1964: "The computer will become the hub of a vast network of remote data stations and information banks feeding into the machine at a transmission rate of a billion or more bits of information a second. Laser channels will vastly increase both data capacity and the speeds with which it will be transmitted.

Eventually, a global communications network handling voice, data and facsimile will instantly link man to machine--or machine to machine--by land, air, underwater, and space circuits. [The computer] will affect man's ways of thinking, his means of education, his relationship to his physical and social environment, and it will alter his ways of living... [Before the end of this century, these forces] will coalesce into what unquestionably will become the greatest adventure of the human mind."--from *David Sarnoff* by Eugene Lyons, 1966.

GROWTH OF RADIO INDUSTRY RAPID IN PAST FOUR YEARS

Sale of Apparatus This Season Expected to Surpass All Previous Records—Radio Business Compares Favorably With Many Long-Established Industries

NOV. 2, 1924, will be the fourth anniversary of radio broadcasting. On that date in 1920 KDKA radiated the first program into the ether surrounding Pittsburgh. Since that time broadcasting has developed rapidly. Today KDKA has a short wave transmitter, besides its regular broadcasting equipment, which can flash broadcasts to England. There the waves from Western Pennsylvania are intercepted, amplified and rebroadcast so that they can be heard in India or Africa as well as throughout the British Isles. A special concert of Spanish music is sometimes played in Pittsburgh for listeners in the Argentine. The relay station is then KFKX, Hastings, Neb. KDKA's short waves are picked up and reradiated on a higher wave length and sent across the Equator into the Far South. Broadcasting, which was once confined to the area of one city, is now nation-wide and will very shortly be international.

Long-distance record transmissions have been reported by several stations. WHAZ, at Troy, N. Y., apparently holds the record. Concerts radiated by this station were heard on four successive mornings in Incargill, New Zealand, a distance of 9,577 miles. WJAZ has been heard in Samoa, 7,000 miles; WLAC reached Soviet Russia, 6,650 miles, and WGY and WEAF both have been heard in South Africa, a distance of 7,980 miles. Eleven American broadcasting stations were heard in England during the international tests last year.

David Sarnoff, General Manager of the Radio Corporation of America, has predicted that within the next year the farmers in Kansas and Missouri, as well as the city dweller, might hear radio programs from Paris, London, South America and other parts of the world. "International broadcasting which will link up the furthermost corners of the earth is closer at hand than the public imagines," said Mr. Sarnoff when speaking before a meeting of electrical dealers. Greatly increased power of broadcasting stations and more completely developed rebroadcasting schemes, he believes, will enable programs to be heard simultaneously around the earth's surface.

Sales Volume Increased.

As broadcasting has widened its scope and gained more followers, so has the radio industry developed. The radio business has grown in four years to a sales volume of $113,000,000 in 1923, and the Copper and Brass Research Association, after a survey of the radio field, estimates that the business of the radio industry for 1924 will reach the $200,000,000 mark, and within two or three years sales will reach the $500,000,000 mark.

A vacuum tube manufacturer estimates that sales of tubes alone for the present year will total in excess of $50,000,000, while one of the leading parts manufacturers estimates that as much as $250,000,000 will be spent for radio parts and sets. Sales of dry cells and batteries are placed at $15,000,000.

Sales of home radio equipment alone for 1924 will reach a total of $240,000,000 in the United States, or double those for 1923, and radio audiences, listening-in on receiving sets to the broadcast speeches, lectures, concerts and musical entertainments of various sorts, are now estimated at 5,000,000 persons.

According to Roger W. Babson, the radio industry has grown so rapidly in the past two or three years that it compares favorably with many of the important long-established industries. The value of the radio business is nearly twice as great as that of the carpet and rug business. For every dollar spent on furniture, 33 cents is spent on radio. For every dollar spent on boots and shoes, 35 cents is spent on radio. For every dollar spent for musical instruments of all kinds, including phonographs, pianos, organs, &c., 75 cents is spent for radio. The value of the radio business amounts to nearly three-fourths of the jewelry business as a whole, including clocks, watches and novelties.

Sales of radio apparatus are nearly twice as large as all kinds of sporting goods.

The immense growth of radio is indicated in the report of the Radio Corporation of America for the past year. The business of the company increased from a gross income of about $15,000,000 in 1922 to more than $26,000,000 in 1923. The net income is reported to be $496,709 in 1921, $2,974,370 in 1922 and $4,737,774 in 1923. Practically all of the increase in business resulted from the sale of receiving sets. Of the net income of the company only 9.5 per cent. increase occurred in transoceanic telegraphy and 17 per cent. in the marine traffic.

Current assets of the corporation exceed the liabilities by more than eight million dollars, and the 7 per cent. dividend on the preferred stock has been made cumulative.

2,000 Radio Manufacturers.

According to Alfred M. Caddell, Secretary of the American Radio Association, a survey made by that organization reveals that there are more than 2,000 manufacturers of radio supplies in the United States, ranging from the manufacturers of complete sets and tubes to coils and other parts.

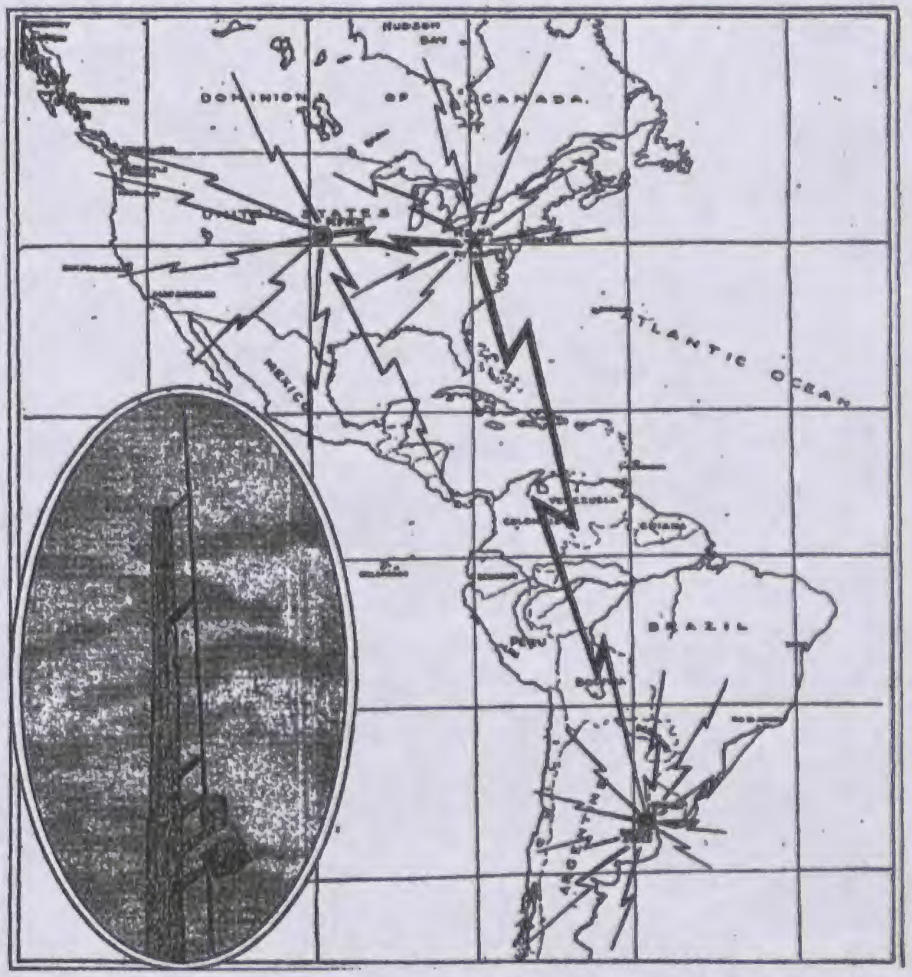
There are about 1,000 distributers and 27,000 retailers. More than 250,000 persons are connected directly or indirectly with the manufacture and distribution of radio supplies. All told, it has been estimated that a $300,000,000 radio business was done in the United States last year, and $50,000,000 of this was done in vacuum tubes alone. Judging from the volume of business done so far this year, it is calculated that the business will aggregate $300,000,000 for the year 1924.

Figures of the American Radio Association show that there are probably between 2,500,000 and 3,000,000 tube sets now in use. Probably 5,000,000 to 7,000,000 crystal sets are owned in this country.

There are now 327 broadcasting stations in the United States and close to a total of 1,000 broadcasting stations in the world; 18,000 amateur transmitters in the United States and about 16,000 ship and shore commercial stations. England has 600,000 broadcast listeners.

Four years ago the radio industry was not considered of sufficient importance to give it an individual classification in the field of business. It was grouped under electrical products, along with electrical toys. When broadcasting started many hailed it as a fad. Today it is considered one of the first forty industries of the United States, and the sales of radio equipment are not likely to reach a saturation point for at least ten years to come.

Business in radio circles during the past Summer has shown an increase of 50 per cent., according to a report recently issued by the radio apparatus section of the Associated Manufacturers of Electrical Supplies. From present indications manufacturers are anticipating a Fall and Winter season that will establish new records in the gross volume of radio merchandise sold.



WHEN KDKA BROADCASTS TO THE ARGENTINE

KDKA has a short wave radio relay system in operation between Pittsburgh and Buenos Aires, and it was used to send the blow for blow description of the Firpo-Wills fight direct from the ringside at Boyle's Thirty Acres, to listeners in South America. KFKX, Hastings, Neb., intercepts KDKA's 100 meter waves and relays them to Argentina, where they are detected, amplified and rebroadcast. Insert shows Pittsburgh's new type short wave aerial.

SEXTET OF STATIONS BROADCAST OVER A SPAN OF 7,000 MILES

KDKA, Pittsburgh, Intercepted Words From New York via Schenectady Station and Relayed on Short Wave Lengths to California and England.

WHEN broadcasting first started entertainers had to go to the radio studio to perform before a microphone. As the art of broadcasting advanced the microphone was taken from the studio and placed in concert halls, churches and theatres. This system is called remote control broadcasting. Telephone or telegraph wires are used to connect the remote microphone with the transmitting apparatus at the station.

Telephone wires are more satisfactory than telegraph wires for this type of broadcasting because they are designed to handle voice currents.

To make use of telephone wires is an additional expense for a radiophone station, and for that reason the majority of stations do not use the remote control system.

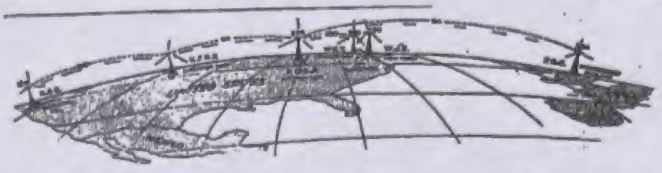
Grover A. Whalen, Commissioner of Plant and Structures of New York, recently gave out a letter he addressed to the Federal Trade Commission, denouncing the American Telephone and Telegraph Company. In part of the letter he said: "A successful broadcasting station must employ at times the use of telephone lines to broadcast from points different to those owned between those tapping the other in California and those tuning the dials in England.

How the System Worked.

This is how the international relay system worked: The microphones on the members' table were connected by telegraph wires to Station WJZ, on top of Aeolian Hall, from which point the program was sent into the air on WJZ's regular wave length, 455 meters. Land wires were used between WJZ's amplifying apparatus and WGY, Schenectady, which radiated the program on 380 meters simultaneously with the New York station. Station KDKA, Pittsburgh, intercepted WGY's waves on a special set of receiving apparatus. KDKA amplified the Schenectady signals and rebroadcast them simultaneously on 64 meters and on the station's regular wave length of 326 meters. Radio amateurs in the range of KDKA heard the 326-meter signals, but the 64-meter waves had repeater stations at Hastings, Neb., and Manchester, England, as their destination. The Manchester station was linked with seven British broadcasting stations, and as soon as the Pittsburgh waves were picked up they were amplified and re-radiated over the British Isles and parts of Continental Europe. At Station KFKX, Hastings, Neb., the short wave signal from KDKA was damped and broadcast simultaneously on 109 meters and 200 meters. The complementary wave length of that station, 1,500 meters, in tune with KFKX heard the 200-meter signal, while the 109-meter wave, below the range of the average receiving set, went on to KGO, Oakland, Cal., from where the original New York program was rebroadcast on KGO's regular wave length, 312 meters.

One hour and three minutes after the first words entered the other radiograms from Manchester and London were read at the dinner reporting reception of the speeches. A few minutes later a wire was received from San Francisco that the words spoken in New York were clearly heard along the Pacific Coast despite the relaying across the continent.

This relay system is now in regular operation between Pittsburgh and Hastings, Neb., and Manchester, England. It is expected that KGO, Oakland, will be a regular part of the International radio chain in the near future. This will permit listeners to the West and in England using simple crystal detector sets to hear the programs of KDKA at least 4:45 o'clock, as sunset time in the vicinity of Washington, Pittsburgh, Hastings, Neb., Manchester, England, Pittsburgh, Oakland, Cal., and Los Angeles, Cal., is the same in each.



INTERNATIONAL RADIO BROADCASTING SYSTEM.

The six radio broadcasting stations shown here radiated simultaneously the Massachusetts Institute of Technology dinner from the Waldorf-Astoria. The distance spanned was 7,000 miles and the Hertzian waves covered 1,500,000 square miles.

distant from the transmitting station. The telephone company has again adopted the broad policy of saying: "You may lease our telephone lines. If you use our station for toll or hire, but if you use any other broadcasting station you cannot lease our lines." Thus the dominant member of this combine by these special concessions of toll service, advertising, increased power and remote control is enabled to control and maintain a monopoly of the air, dictating that no other station shall collect toll, shall advertise, shall use high power or augment its service by the use of telephone lines."

A complaint has been made through Station WJAZ, the Bendix-Edgewater Beach Hotel broadcasting station, that Chinese radio listeners were barred from

RADIO NOTES AND GOSSIP

A DEBATE was recently held between the University of California and the University of Oregon, the issues being separated by 750 miles. The Oregon debaters presented their case through station KGW, Portland, Ore., and the Californians through Station KLX, Oakland, Cal. The debate was declared one of the most interesting radio events of the year in the West, and it is reported that the debating societies of the two institutions will make the radio debate an annual collegiate affair. It is estimated that 500,000 tuned in the debate. Amplifiers in-

indicator attached to the receiving apparatus. The time is measured by the distance between the photographic impressions on a film similar to that of a motion picture.

***

Secretary Hoover in an address last Tuesday, giving his approval to the purposes of the White bill, which will give more effective governmental supervision of radio, said: "We cannot allow any single person or group to place themselves in a position where they can censor the material which shall be broadcast to the public, nor do I believe

IS NOW EXPECTED

New Commission With Jurisdiction Over Wire And Radio Communication Looms Up—Senators Tell What They Think About It

UNQUESTIONABLY one of the outstanding pieces of radio legislation with which the next Congress will concern itself is consideration of establishment of a Federal communications commission, according to reports from Washington. Such a commission as this would absorb the Federal Radio Commission and with greater jurisdiction would take over the control of the wire services—telegraph, telephone and cable—as well as radio. It would govern all the functions now exercised by the Interstate Commerce Commission with regard to wires.

It is said on excellent authority that one of the reasons of again limiting the active administrative life of the present Radio Commission was to leave President Hoover free to appoint an entirely new commission in case a communications commission becomes a reality. In addition to some one versed in radio, the larger commission would have to include in its membership those with a knowledge of the telegraph, telephone and cable.

It is further reported that the principal opposition to the communications commission idea has been from the wire people, who would object to having their wires controlled by anything that wholly, or in part, smacks of a radio commission.

Nevertheless, the creation of a new commission is regarded as a certainty by Senator James E. Watson of Indiana, the new Republican leader; Senator C. C. Dill, Democrat, of Washington State, looked upon as an authority in radio matters in the Senate; Representative Wallace White, Republican, of Maine, chairman, and Representative Ewin L. Davis, Democrat, of Tennessee, ranking minority member, respectively, of the House committee having to do with radio.

Opinion of Judge Davis.

"The next Congress," Judge Davis said, "in my opinion, will place on the statute books a law creating a communications commission, having the same jurisdiction over radio, telegraph, telephone and cable services that the Interstate Commerce Commission has today over the railroads of the country. Of course there will be opposition to it, but so there was opposition from the railroads at the time the original Interstate Commerce act creating the Interstate Commerce Commission was passed.

"Senator Watson, chairman of the Senate Committee on Interstate Commerce, already has introduced such a bill and he has the cooperation of Senator Dill, active in radio legislation in Congress. I shall be glad to cooperate with Representative White, chairman of the House Committee on Merchant Marine, the committee having in charge radio legislation, and with other leaders of the House, including the Interstate Commerce Committee, in any legislation affecting interstate commerce matters.

"Leaders in radio legislation on both sides of the House are in favor of such a commission, but whether it should be an entirely new organization or a conversion of the Federal Radio Commission, which expires by limitation Dec. 31, will have to be determined. Such a commission, however, is the logical outcome of the rapid development and differences of views and confusion in the radio situation of today."

Text of Watson Bill.

Part of the text of Senator Watson's bill, which he introduced in the Senate during the last session of Congress and which it is understood the Senator will re-introduce in the forthcoming Congress, is as follows:

"Be it enacted by the Senate and House of Representatives of America in Congress assembled,

"That in order to provide for the regulation and control of the transmission of intelligence by telegraph, telephone, cable and radio, and of common carriers engaged in such transmission, there is hereby created an independent establishment in the executive branch of the government to be known as the Federal Communications Commission (hereinafter referred to as the commission), and to be composed of seven members, appointed by the President by and with the advice and consent of the Senate.

"Sec. 2. The terms of office of the members of the commission first taking office after the approval of this act shall expire, as designated by the President at the time of nomination, two at the end of the first year, two at the end of the fourth year, and three at the end of the seventh year, after the date of the approval of this act. The terms of office of all successors shall expire seven years after the expiration of the terms for which their predecessors were appointed; but a member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed only for the unexpired term of his predecessor.

"Each member of the commission shall receive a salary at the rate of $10,000 a year, together with necessary traveling expenses and expenses incurred for subsistence or per diem allowance in lieu thereof, within the limitations prescribed by law, while away from the principal office of the commission on business required by this act, or if assigned to any other office established by the commission, then while away from such office on business required by this act.

"Vacancies in the commission shall not impair the powers of the remaining members to execute the functions of the commission, and a majority of the members in office shall constitute a quorum for the transaction of the business of the commission.

"Sec. 3. The commission shall annually designate a member to act as chairman of the commission; shall maintain its principal office in the District of Columbia, and such other offices as it deems necessary; shall have an official seal, which shall be judicially noticed; shall make an annual report to the Congress; may make such regulations as are necessary to execute the functions vested in it by this act.

"May appoint and fix the salaries of such experts and, in accordance with the Classification act of 1923 and subject to the provisions of the civil service laws, a secretary and such other officers and employes, and make such expenditures (including expenditures for rent and personal services at the seat of government and elsewhere, for law books, periodicals and books of reference, and for printing and binding) as may be necessary for the execution of the functions vested in the commission. All expenditures of the commission shall be allowed and paid upon the presentation of itemized vouchers therefor approved by the chairman.

"Sec. 4. There are hereby transferred to the commission all functions of the Interstate Commerce Commission under the Interstate Commerce act, as amended, and any other provisions of law, in respect of the transmission of intelligence by telegraph, telephone, cable or radio, and common carriers engaged in such transmission."

RADIO

1,500,000 SETS NOW IN USE

BEGINNING on Nov. 26 station WJZ at Newark will broadcast the first of a series of thirteen popular concerts by the City Symphony Orchestra. These concerts will be held in the Manhattan Opera House, New York, and conveyed to WJZ by a special wire. The orchestra will consist of eighty-three players. The music is to be broadcast on a wave length of 360 meters.

The United States Agricultural Department has established an international crop service. The department's Berlin representative recently sent a radiogram to the Department of Agriculture regarding beet sugar production in Germany. The message was relayed throughout the United States by radio, and was in the hands of receiving operators all over globe scarcely in less than five minutes after the time it left Berlin.

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Successful experiments recently were conducted near Birmingham, England, to determine if radio service could be made useful as a means of communication between the lower levels of a coal mine and the pit-head offices. The main shaft of the colliery was almost 2,100 feet deep.

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It has been estimated that there are 1,500,000 radio receiving sets in homes throughout the United States. Pittsburgh is said to have a radio set in one home out of every six and Detroit approximately 80,000 receiving sets.

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The Harvard-Yale football game to be played in New Haven next Saturday will be broadcast play by play from WEAF, the American Telephone and Telegraph station in New York. Microphones will be arranged so that the cheering and songs may be heard on a wave length of 400 meters. The Army-Navy game to be played in Philadelphia on Nov. 29 will be broadcast direct from the gridiron through WJZ at Newark.

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The Pacific Coast States have a plan which provides for the closing down of all broadcasting stations at 10 P. M., thereby giving radio listeners in that vicinity an opportunity to hear concerts from the East. WOC of Davenport, Iowa, closes on Tuesday evenings for the same reason.

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There was an increase of twenty-four broadcasting stations during October. On Nov. 1 there were 358 stations in the United States. Nineteen of this number broadcast on 400 meters as Class B stations. With the shut down of WHAU, Mississippi comes off the broadcasting map. States with single stations are Delaware, Wyoming, New Hampshire and Vermont.

Broadcasting of the Britton-Walker welterweight championship fight on Nov. 1 was heard in Gauvchalis, Porto Rico. The gong and clamor of the crowd at the ringside in Madison Square Garden and the description of the fight, blow for blow, was clearly audible in Porto Rico.

Long-Range Set.

The wiring diagram on this page shows the connections of a spider-web tuner, detector, and a two-stage audio frequency amplifier. The three spider-web coils are wound with No. 22 D. C. C. wire. L1 has seventy-five turns, L2 has fifty turns and L3 has thirty-five turns. The coils should be mounted on wooden rods so that two of them can be moved back and forth, altering the distance between the coils. The secondary coil is stationary and the other two movable. C1 represents a forty-three-plate variable condenser, C2 one of twenty-three plates. The B battery on the detector is twenty-two and a half volts. The B batteries used on the amplifiers are each forty-five volts. A potentiometer, denoted by P, adds to the efficiency of the set. After the set is once adjusted, practically all the tuning can be done by condenser C2 and the tickler coil L3. It is important that the polarity of the batteries be as indicated on the diagram.

A set of this kind is in operation at Pelham, N. Y., and has received concerts from fifty-three stations, ranging from Boston to Havana, and as far west as Davenport, Iowa. The set is selective, so that WJZ or WEAF can be tuned out completely, permitting reception from KDKA, PWX, WOC or any other distant station. On election night returns were received from eleven different stations. By a slight adjustment of the condenser any one of the stations could be tuned in without interference from any of the others.

Radio Technique.

"A neighbor has a radio receiving set identical to mine, including the length of the antenna, the type of instruments and the ground connection to the radiator. We both hear many of the broadcasting stations, but I am troubled with interference. My friend can tune in or cut practically any station without interference from the others. What can you suggest to make my set selective?" This is a typical question asked by many radio followers each week.

Successful radio reception does not depend on the set alone, but requires a certain skill and technique in tuning and handling the instruments, similar to the technique necessary to play a violin or any other instrument. Poor results in radio receiving such as feeble signals, short-distance range, maximum interference and distorted music can be attributed nine times out of ten to faulty manipulation of the instruments.

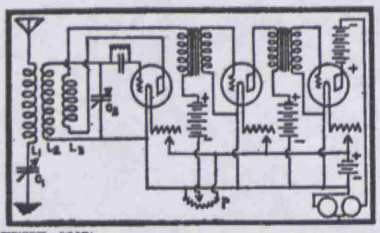
Seldom are two vacuum tubes alike, so there is one point in the circuit where the sets will differ and require adjustment. Perhaps one operator is burning the vacuum tube filament at proper brilliancy, so the tube is just below the oscillating point, the ideal condition for efficient operation. The filament should not be lighted to maximum brightness as is the opinion of many owners of radio sets. The filament current control is afforded by the A battery rheostat. Careful and delicate adjustment of the filament current is necessary for successful reception. Some manufacturers and builders of radio sets, realizing the importance of filament current control, provide a vernier rheostat in series with the main rheostat. The vernier has about one ohm resistance and has smaller turns of wire, permitting finer adjustment. It will be well to note in this connection that refined and steadier control also may be accomplished by the addition of a 200 ohm potentiometer placed across the terminals of the storage battery as shown in the wiring diagram. The addition of such a potentiometer to any vacuum tube set will produce better results in finer tuning and in the elimination of interference.

Skillful adjustment of the inductance coils and condensers, the tickler coil and the degree of coupling come only through experience and practice. Loud signals and long-distance receiving ranges cannot always be credited to the set alone, but to the ability of the operator in manipulating the apparatus, just as the music of a violin depends as much upon the musician as upon his instrument.

There are a multitude of details which play important parts in successful radio reception. Among the essential things to watch in connection with the set are soldered connections throughout the circuit, neatness, protection of the set from accumulation of dust and dampness, proper length of antenna, a good ground contact, correct voltage values of the B batteries and many other things which seem unimportant to the layman. In soldering contacts or joints in any type of receiving set care should be taken not to use too much flux, for if the grease used in the flux spreads between the wires it will produce a high resistance which will cut off signals entirely or cause "howling" in the phones. The trouble which develops even in the best of sets generally may be traced to lack of attention. The proper size to slide in and out of the primary. Use No. 36 D. C. C. wire for the secondary winding and tap it similar to the primary.

Question—What determines the difference in the various types of vacuum tubes? (2) Why are some filaments coated? (3) What are filaments generally made of?—H. M. R. Answer—The difference may be attributed to difference in material used in construction, degree of vacuum, different gas used in exhausting the tube, areas of the plate and grid, and the distance between the grid, plate and filament. (2) So the electrons can be emitted at lower temperatures, thus allowing the use of lower voltage, insuring longer life of the filament and battery. (3) Tungsten.

Question—Please explain the difference between audio and radio frequency amplification. (2) Just what is meant by audio in radio language?—H. T. C. Answer—Audio frequencies are those which can be heard by the human ear. Audio frequency amplification is the amplifying of the signal strength after it has passed through the detector. Radio frequency amplification is the amplifying of the signal strength before it reaches the detector. Detectors have a critical point at which they begin to function. Signals which come in too weak to reach the critical point make no impression on the detector. Radio frequency amplification builds up the weakest of signals, giving them sufficient strength to actuate the detector. One chief advantage of the radio frequency method is that it amplifies the incoming wave and not the many little imperfections which exist in the receiver circuit. Audio frequency produces greater volume of sound and radio frequency increases the range of the set.



Question—What is meant by the dimensions and size of wire for a loose coupler suitable for reception direct from Arlington, Va.—H. P. Answer—Arlington's wave length is 2,650 meters. Wind about 400 turns of No. 24 D. C. C. wire on a tube 4 inches in diameter for the primary and take taps off to a suitable variable condenser. The secondary should be wound with about 600 turns of No. 26 D. C. C. wire on a tube 3½ inches in diameter. Use a variable condenser of about .0005 mfd. capacity.

Question—Please explain the difference between a tuned radio frequency receiver and a regenerative receiver.—H. S. Answer—In the tuned radio frequency receiver the current absorbed by the antenna wires from a passing radio wave is extremely feeble. Every slight improvement in the circuit which will make an easier path for the minute impulse of the incoming signal will help to produce louder and clearer effects and at the same time increase the receiving range.

Two sets may be identical, right from the antenna through the apparatus to the ground, but results will vary according to the consideration given to details and the technique of tuning.

Questions and Answers.

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RADIO MUSIC BROADCAST PERFECTLY

There still exist people who will not allow a phonograph in their homes. The first impression given by the big horns attached to the machines in their infancy made many people feel the phonograph would never produce clear music. Big horns protruding from the windows of radio shops have in the same way given a bad introduction to radio. The music from such horns has been distorted and mixed with a "tin" sound.

Those who were in tune with the Echola Cantorum at Carnegie Hall last Wednesday night through the apparatus of WEAF, heard a concert that gave conclusive proof that music and radio are closely allied. The rich timbre of Giannini's soprano voice carried through the ether lines with entire fidelity. So perfectly did the Hertzian waves spread the music through the air that listeners in the Middle West and as far South as Florida were made to feel that they were seated in the New York Carnegie Hall.

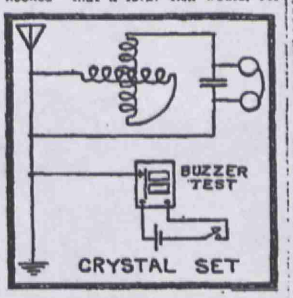
In the operating room of WEAF is a device which picks up the sound direct from the studio and also from a radio receiving set. One turn of a switch and the music comes direct from the studio and a second turn of the switch brings the music in from the ether. So true is the reproduction by radio that no one can tell whether the music is being picked up by the receiving set or if the tunes are coming direct from the studio where the entertainer sings or plays before the microphone.

Radio Like Fishing.

"Just what is the lure of radio?"

"Radio is like fishing," is the explanation offered by a commuter during a smoking car discussion in a suburban train. "I get all the old thrill of that sport from this pastime. The little fish are the local broadcasting stations; the big ones those further off. The bigger fish you go after the more expensive the tackle. To me each station I land is a bite and the gameness of the fish is the amount of difficulty one has in keeping out of interference. A group of us who have radio sets have a 'radio fishing club,' and we each keep score of the 'fish,' we land and tally up at the end of the week.

"The distant stations—the big fish—give one all the thrill to keep them 'hooked' that a large fish would, for



there is always a fight to keep them on the line. There is static and code interference to aid them in escaping. I get just as much thrill some nights with my radio set as I do in the Summer with the rod and reel."

Apartment Radio Equipped.

The great interest manifested in radio was recently shown when a large advertisement appeared in St. Louis papers of a fifty-four apartment building being completed in which every apartment is furnished with a complete radio equipment. In the same issues of the newspapers the volume of radio want advertisements equaled about one-third that of automobile want advertisements.

Ten-Minute Service to Germany.

The Express Service Company, Berlin, has begun a daily service of financial and commercial news broadcasting to subscribers in various parts of Germany. Financial news is received from the United States and other countries through the high-power station at Nauen. This information is broadcast immediately by radio telephone to the subscribers, numbering about 800, mostly banks and industrial institutions located in about 200 cities. Each subscriber rents from the company the necessary receiving apparatus. There are two half-hour schedules daily, beginning at 9:30 A. M. and 5:00 P. M. New York stock quotations handled by this service is generally available to subscribers within ten minutes after the dispatch leaves New York.

Broadcasting in France.

Paris has two broadcasting stations. Station Fl., Eiffel Tower, has a power of two kilowatts and operates on the 2,800-meter wave length. Concerts are broadcast from Fl. daily at 12:55 A. M., Eastern Standard Time. The second station in Paris is called "Radiola." This station has one and one-half kilowatts and broadcasts on 1,000 meters daily at 9:43 A. M., and from 2:43 P. M. to 3:15 P. M., Eastern Standard time.

Symphony Concerts.

Symphony concerts will be broadcast from station WGY, Schenectady, N. Y., Sunday afternoons at 4:30 o'clock during April. WGY will operate on the 379-meter wave length.

Programs Classed as Advertising.

The Newspaper Proprietors' Association and the Newspaper Society in the British Isles have notified the Radio Broadcasting Company that no radio programs would be inserted after Feb. 15 unless paid for at regular rates. Previously the newspapers printed as news the daily and week-end programs of the British Broadcasting Company, the combination of radio manufacturers which has been entrusted by the Postmaster General with the arrangements for broadcasting daily programs.

The broadcasting company answered that it would not use advertising space to announce its programs. In London papers the programs have occupied spaces of several hundred agate lines, which would mean about $500 daily at the space rates.

Trans-Canada Test.

Canadian amateur operators will attempt to relay a message from Montreal to Vancouver, 2,880 miles, on the nights of March 24, 25 and 26. The American transcontinental amateur record, made in January, 1924, is six and a half minutes across the United States and return. The Canadians will try to set a new record.

Sparks Disappear.

Passing of the spark transmitter in favor of continuous wave transmission for amateur wireless stations was indicated in the American Radio Relay League traffic report for February. Out of a total of 121,582 messages handled by members of the league 108,713, or 89 per cent., went through the air over the continuous wave route.

Radio Pilots Ship.

Captain Ritore Zar of the steamship Presidente Wilson heard so many bells and whistles and saw the intermittent flashing of so many lights as the ship approached New York in a fog during the past week that he thought his ship was up the Hudson. He says the rum runners are endangering navigation off the entrance of New York harbor. The radio compass confirmed the position of the ship as between Fire Island and Ambrose lightship.

Fight Broadcast to Argentina.

Radio listeners in the Argentine, 6,000 miles from Madison Square Garden, heard the Firpo-Brennan bout round by round. An observer at the ringside telephoned the description of the fight to the Broad Street operator of the high-powered station radio central at Rocky Point, Long Island. By dots and dashes the news was flashed to Buenos Aires, where it was picked up and broadcast by radiophone.

Radio Advertising.

Radio is a great advertising medium. Talks are broadcast from one radiophone station at the rate of $150 for fifteen minutes and $100 for ten minutes during the evening. The day rate is one-half.

A five-year-old boy was asked by his school teacher if he could spell Schenectady. "Sure," was the quick reply, "WGY." WOO means Wanamaker and WIP is the Hertzian wave name for Gimbel Brothers in Philadelphia. WOR is the radio name for L. Bamberger & Co., and is as well known in Texas as it is to residents of Newark. Drake's Hotel, Chicago, is probably mentioned by more people daily than any other hotel in the United States. Shepard's store in Boston a few years ago was known chiefly in Eastern Massachusetts, but the Shepard Colonial Orchestra, line carried the name WNAC across the continent. Davenport, Iowa, Lockport, N. Y., and hundreds of other towns and cities were little heard of several months ago, but now music from such cities makes it seem as if radio has linked all cities and hamlets close together. In New York, WOC, Davenport, sounds like part of Manhattan Island and Main Street in Lockport just a continuation of Broadway.

If national advertising can be considered a definite asset then wireless is paying big returns. The initial cost of stations such as WOC, Davenport; WWJ, Detroit; WSB, Atlanta, and WRAP at Fort Worth is estimated to be about $25,000, with a weekly operating cost of $500. The radio files of station WRAP, The Star-Telegram, Fort Worth, Texas, it is reported, hold about 90,000 letters and postcards and 3,000 telegrams, unsolicited, from listeners from all parts of the United States, Canada and Central America. The import of these letters is said to be: "I didn't know Fort Worth was on the map. Now when Texas is mentioned I think of WBAP, Fort Worth."

PWX Talks About Cuba.

Since Station PWX began to broadcast at Havana, Cuba, last Oct. 10, some time has been devoted on each program to advertising Cuba as a place in which to spend the Winter or in which to live and invest money. Through the Cuban microphone the announcer in Havana sent his voice to all sections of the United States in an effort to "clear up the distorted idea of the Republic of Cuba." He opened the talk as follows:

"The Island of Cuba is approximately 760 miles long. Its area is 44,841 square miles, a trifle larger than that of the State of Pennsylvania. Placed on the map of the United States it would reach from New York City to Indianapolis, with an average width equal to that of New Jersey. No snakes or poisonous reptiles are found in Cuba."

Singers and instrumentalists unknown a year ago are now well known through their songs and music broadcast by radio. More people have enjoyed the Hotel Pennsylvania Grill Orchestra this Winter than ever before because WJZ sent the syncopated melodies over an area of many hundred miles. So great were the crowds at the Manhattan Opera House after the first opera was broadcast that the management could not account for the increased interest in opera. No previous advertising had brought such a multitude of ticket seekers to the box office. So true and clear did the opening opera pass through the ether lanes that many radio listeners were inspired to see it.

Moving picture theatres have microphones placed near the orchestra pits and near the organ to pick up the music played in connection with the pictures. Incidently the performance is advertised and sometimes a synopsis of the play is sent out to the radio audience. Theatres also broadcast their entire show or several acts to create the desire among radio listeners to attend the theatre. Jackie Coogan and a number of motion picture stars have spoken into the radio microphone to tell of their latest productions and arouse the interest of those in tune with the voice.

Inexpensive Receiving Set.

Letters received by THE NEW YORK TIMES indicate that there are many people within a fifteen-mile radius of broadcasting stations who desire to listen to the radio concerts with a simple set, which will serve as a good beginning and training in radio.

The simplest form of detector is the crystal. The beginner using a crystal detector will enjoy clear, distortionless music, without the howls and whistles as created by the vacuum tube detector. The wiring diagram on this page consists of a crystal detector, variometer, .001 mfd mica fixed condenser and a pair of phones. If a vacuum tube set is substituted for the crystal set later, the variometer and phones can be made part of the equipment, so it is a good plan to buy reliable and well-designed instruments in the beginning. The ideal antenna for broadcast receiving is a single copper wire about 100 feet long, including the length of the lead-in wire. The higher the antenna the louder will be the signals. An indoor antenna or light socket will not give satisfactory results in connection with a crystal set. The ground connection should be firmly clamped to a clean surface on the radiator or cold water pipe.

All tuning is done by the variometer. The detector can be adjusted to its most sensitive position by a buzzer test before the concert begins. A buzzer test consists of an ordinary electric buzzer, dry battery and push button. The vibrator point of the buzzer is connected to the ground wire. Place the buzzer in a box and pack it with cotton so the sound of the buzzer can be heard only in the phones. When the push button closes the circuit the little wire, called the "cat whisker," is moved over the surface of the crystal until the buzz is loudest in the phones. The operator then knows the set is adjusted without waiting until the concert begins to search about for the most sensitive spot on the crystal. The average range of a crystal set is about twenty-five miles.

QUESTIONS AND ANSWERS.

Question—My set will tune up to 630 meters. How can I reach 710 meters?—J. M. Answer—Use a loading coil four inches in diameter wound with fifty turns of No. 24 D. C. C. wire. Take off five taps. The coil is placed in series with the antenna.

Question—(1) Has station NAQ, Jupiter, Fla., been closed? (2) Who is NDW?—T. F. H. Answer—The naval radio station NAQ, Jupiter, Fla., was closed to all commercial traffic at midnight Feb. 3, 1923. (2) Cape Hatteras.

Question—Can you tell me why my single-wire antenna brings in louder signals than my double-wire antenna? The total length of the single wire is 123 feet. It is sixty feet high. The total length of the double wire is 138 feet. It is only fifteen feet high.—A. R., Jr. Answer—The single wire antenna is forty-five feet higher than the double wire and that accounts for the louder signals. The higher the antenna the louder will be the signals and greater the distance covered.

Question—What is the rate for commercial traffic through naval radio stations along the Atlantic Coast?—S. C. Answer—A new rate 12 cents a word will be effective April 1, 1923.

Question—(1) My set consists of two radio frequency amplifiers, detector and two audio amplifiers. It gives plenty of volume but no range. I cannot hear beyond WOC. What can I do to increase the range to Pacific Coast cities? (2) Located in Connecticut, my antenna is 700 feet above sea level. Should I be able to hear England with this set? (3) Has radio frequency any advantage over a regenerative set?—G. B. Answer—(1) A radio frequency amplifier requires considerable experimenting to get it properly balanced. Make every wire as short as possible and run none parallel or close together. Under good atmospheric conditions you ought to hear Los Angeles stations with your present set if it is properly balanced. Another stage of radio frequency will increase the range, also the volume. (2) About April 1, Station 2LO, London, will conduct tests with WJZ at Newark, so American listeners can tune for England. The tests will be conducted at night, probably on 300 meters. 2LO at present signs off about 6 P. M., Eastern Standard time. (3) Radio frequency amplifiers build up the strength of signals before they reach the detector, giving feeble signals strength enough to operate the detector. Otherwise weak signals would not affect the detector. Regeneration affects only signals of sufficient power to actuate the detector.

THE HOUSE OF MORGAN

A SOCIAL BIOGRAPHY OF THE MASTERS OF MONEY

BY

LEWIS COREY

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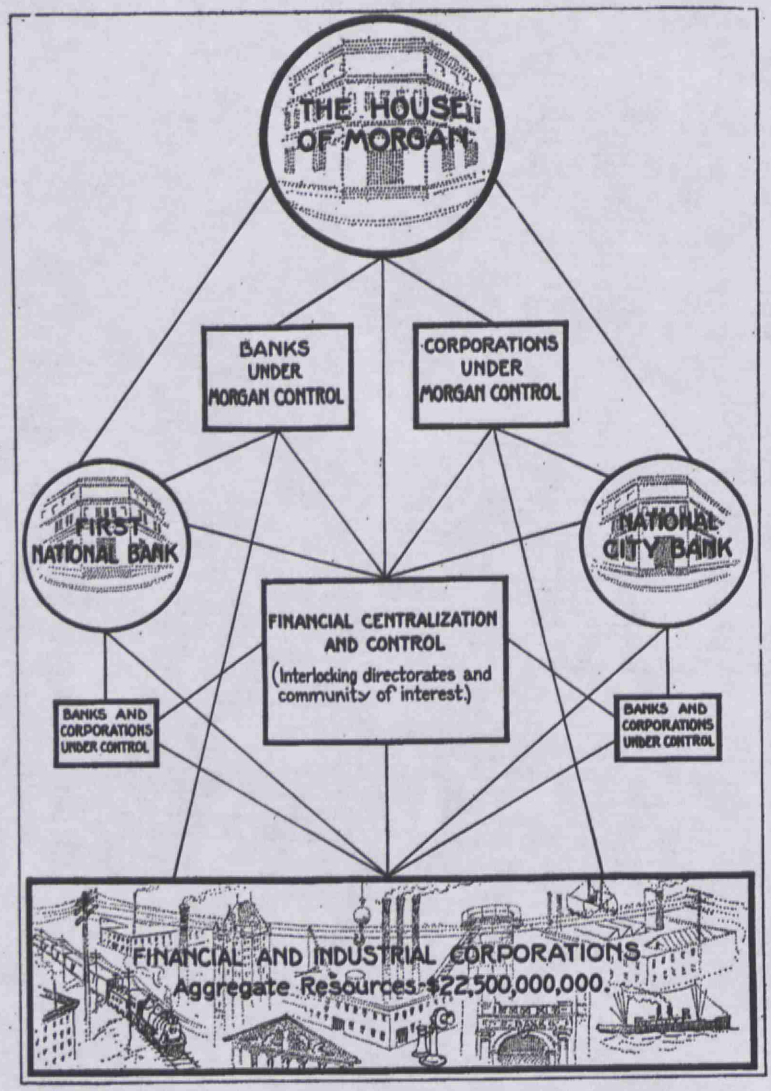

FINANCIAL CENTRALIZATION AND CONTROL, 1912

banks institutionalized an almost complete control of financial resources, regulating industry, determining general policy, national and international, and dominating the government with which they worked in full agreement. Larger financial centralization in Germany, France and England was a result of three factors: industrial and financial combination did not meet with any substantial resistance, the struggles of imperialism demanded unification and centralized manipulation of financial resources, and governments encouraged the centralization of industry and finance.

In the United States, on the contrary, industrial combination and its accompanying financial centralization and control aroused intense resistance. The Granger, Populist and Bryan movements glorified small-scale industry and insisted on restoring competition, while European revolt usually assumed the form of socialist acceptance of large-scale industry and proposals for its socialization. American resistance did not prevent the development of financial centralization and control, but compelled the adoption of comparatively loose and incompletely institutionalized forms.

The system of community of interest, and the emphasis on financial centralization and control operating by means of 180 interlocking directors, disproportionately stressed the personal factors, making centralization appear as if simply the work of predatory financiers. But community of interest meant much more than that. Centralization was the inevitable product of large-scale, concentrated capitalism, developing new institutions and functions; class resistance and government prohibitions interfered with centralization assuming completely institutional aspects, compelling it in many cases to adopt the looser forms of community of interest and personal relationships in order to evade legal restrictions and avoid public antagonism.

These conditions provided an opportunity for the personal dictatorship of J. Pierpont Morgan. In any system where rela-

Coming to power in an age of buccaneering, Morgan retained the spirit of the age while partly changing its methods: the difference between him and Vanderbilt lay not in their sentiments but in the systems under which they operated. Neither the one nor the other considered larger social interests. Both resented the interference of law, public opinion and government. The two men, however, were separated by the difference between buccaneering and dictatorship—Vanderbilt's impulse was to grab, Morgan's to rule. By its very nature as a sort of financial government, Morgan's system suppressed the more flagrant buccaneering practices. But while the system of centralized financial control necessarily excluded Vanderbilt-Gould methods of plunder by lessening competitive struggles, limiting the magnates in waging war upon each other and imposing more responsibility and unity within the limits of Big Business, these changes did not prevent the combined magnates waging war upon the people. In this sense Morganization was as predatory as the buccaneers of the preceding stage in the development of American capitalism.

Of impeccable honor in dealing with associates (an important factor in his supremacy in the community-of-interest system), Morgan had little sense of responsibility beyond his immediate associates and enterprises. "I owe the public nothing," he said, expressing class arrogance, aristocratic bias and the logic of the financier impatient of restraint by the rabble and government. Logic insisted that corporations should not cut each other's throats, that financial control meant more stabilized, efficient and profitable business. But logic is relative and much depends upon its premises. Morgan's premise was that "men owning property should do what they like with it"—the conclusion being that the financier may combine and manipulate as he pleases within the limits of the system in which the financier operates. No interference by larger social interests!

Morgan was the complete reactionary, his contempt of politics being largely contempt of democracy (where it was not

the businessman's snobbish assumption of superiority over the politician). In this contempt of social progress Morgan was the model of his class, as he was also the model in his mannerisms —the arrogance, the eternal big black cigar, the massive truculent silence.

The magnates of industry and finance looked upon their world and called it good. Naturally. It met their needs and accepted their power. The defeat of Bryanism in 1896 and the revival of prosperity a few years later introduced an era of aggressive expansion and consolidation of industry—and immense accumulation of profits. By 1900 triumphant plutocracy appeared supreme, largely unregulated, contemptuous of interests other than its own. Industrial and financial expansion then overshot itself and crashed in 1902-3, initiating a series of reverses for the House of Morgan, temporarily halting the march of combination, and intensifying popular discontent at the abuses of concentrated capitalism. Social revolt flared up again.

This revolt Morgan and the other magnates disdainfully dismissed as demagogic impudence upon which they waged merciless war.

While expressing all the older grievances (limiting of business opportunity by industrial combination, corporate oppression of competitors, railroad rebates, feudal conditions of labor), the new revolt assumed decisive social aspects. The pre-1900 generation struggled for the largest share of the spoils of developing industrialism but did not seriously concern itself with the accompanying evils. Now these evils were exposed and condemned by men and women of another generation who were stigmatized as Muckrakers, from the Man with the Hoe in *Pilgrim's Progress* who was so absorbed in filth that he rejected a celestial crown. But the Muckrakers insisted celestial crowns were conjectural while social filth was real, and proceeded to expose the evils of slums, child labor, low wages, industrial hazards, business buccaneering, political corruption

readjustment in the interests of concentrated capitalism itself, lurked the threat that discontent with corporate abuses might become destructive action against capitalism unless Big Business "cleaned house."

President Theodore Roosevelt, who vocalized the revolt while moderating its temper, declared the magnates' "idiotic folly" and reactionary arrogance encouraged radicalism, insisting that the "serious social problems" produced by industrial development required appropriate legislation, adding, however: "We are not trying to strike down the rich man; on the contrary, we will not tolerate any attacks on his rights." [8] Animated by middle-class horror of class war, Roosevelt proposed to regulate both the plutocracy and the proletariat to secure social peace, condemning socialists and radical union agitators as savagely as the "malefactors of great wealth."

Roosevelt was a political realist, not a radical.

"The great development of industrialism," the President said, "means that there must be an increase in the supervision exercised by the government over business enterprise." [9] Roosevelt urged Federal regulation of corporate combinations to eliminate abuses and unify the larger interests of capitalism, which meant strengthening industrial and financial centralization by adjusting Big Business (which Roosevelt accepted) to government in an irresistible unity for larger economic dominion, particularly in the markets of the world.

But the magnates of industry and finance, led by J. Pierpont Morgan, resisted corporate regulation as much as social legislation, the cry being "Let us alone!" Big Business objected to "increasing the powers of government" (although making no objection to increasing the powers of industry and finance) and maintained that Roosevelt's campaign to regulate corporate combinations "disturbed business." The legend developed that it caused the panic of 1907, the *Commercial and Financial Chronicle* repeating as late as 1911 that "the panic was really the work of Roosevelt himself." [10] During the panic Charles S. Mel-

len, president of the New York, New Haven & Hartford Railroad (under control of the House of Morgan, Mellen being known as "Morgan's office-boy") attacked Roosevelt's regulation campaign as a "drunken debauch" producing business disturbance.[11] Roosevelt replied that his policies, "representing the effort to punish successful dishonesty," did not cause the panic, "but if they have, it will not alter in the slightest degree my determination that they shall be persevered in unswervingly."[12] So bitter was the feeling that the directors of the United States Steel Corporation considered a resolution (which was tabled, however) forbidding Chairman Gary to visit President Roosevelt.[13]

Much of the antagonism was determined by personal animus. Accustomed to buying political subservience with campaign contributions, the magnates resented Roosevelt accepting their money and then denouncing them. In the 1904 election the magnates contributed $2,100,000 to Roosevelt's campaign fund, including $500,000 by George J. Gould, $150,000 by J. P. Morgan & Co. and $100,000 by Standard Oil.[14] The usually astute Roosevelt misread the public mood, and, afraid of defeat, sent for a delegation of magnates (men he had been denouncing as "malefactors of great wealth") to ask for financial help. Among them was Daniel S. Lamont of Northern Pacific and Henry C. Frick of United States Steel. The delegation went secretly to the White House. Roosevelt, according to Lamont, made "distinct promises," while Frick said of the conference, in his usual cynical strain:

"Why, Roosevelt fairly went down on his knees to us in his fear of defeat, and said that he would be good and would leave the railroads and the corporations alone if we would only give him this financial help. We did, but he didn't stay put in his second term. We got nothing for our money."[15]

"He didn't stay put." This infuriated the magnates, unused to "getting nothing for their money." Other things infuriated the magnates still more. They were accustomed to interview the

on a proposed new issue of convertible debenture bonds, J. P. Morgan & Co. withdrew as fiscal agents and from all directorships, revealing that in three years they had raised $168,627,000 for New Haven on which the commissions were $889,000 and the profit only $441,000.[56] The New Haven system was dissolved, dividends suspended, and many years passed before it recovered from the after-effects of its monopolistic spree.

One of the New Haven episodes was Morgan's indictment for conspiracy in a particular railroad transaction. "He wept," according to one chronicler, "and from an aching heart wailed:

"'To think that after all these years I have been branded by my own government a criminal, fit only to be thrown into jail.'"[57]

In the end, as at the beginning, when during the Civil War a Congressional Committee said of Morgan (among others): "He cannot be looked upon as a good citizen." ...

In promoting the New Haven Railroad's monopolistic expansion J. P. Morgan made the same mistake as in the case of International Mercantile Marine—combination apparently for the sake of combination, disregarding decisive economic (and political) considerations. By combining everything in sight, good, bad and indifferent, New Haven wasted money and sacrificed efficiency. Under other conditions monopolizing New England's transportation might have proven profitable by the power to extort monopoly rates, but now government regulation prevented extortion. New Haven's expansion was simply adventurism, the expression of unrestrained personal power; and there was more than the suggestion of megalomania in Morgan's ruthless pursuit of monopolistic combination. Disaster was inevitable. Out of this and other disasters centralized industry and finance learned there are limits to combination in size, character and profits, that combination in itself is not necessarily a good thing, producing many important changes in structure and policy. The New Haven experience, moreover,

provoked more stringent government regulation of railroads.

Meanwhile, on another front of the campaign, regulation was being imposed on the trusts. By 1904 there were 440 trustified combinations capitalized at $20,379,000,000, one-third under control of seven combinations over which towered the United States Steel Corporation.[58] The most important of these trusts were under control or influence of Morgan. In spite of intense corporate opposition the Federal Government organized a Bureau of Corporations, one of the first acts of which was to investigate United States Steel. In 1905 the Beef Trust was ordered dissolved, Swift & Co. and others being restrained from illegal combination in restraint of trade, from organizing to maintain prices, and from receiving discriminatory railroad rates.[59] This decision was considered a victory for Theodore Roosevelt, and he proceeded to press the regulation campaign more vigorously. President Roosevelt instituted twenty-five anti-trust prosecutions and President Taft forty-five (although Taft was considered "conservative" in comparison with the "radical" Roosevelt).[60] The government's arm was steeled by exposures of trust iniquity: among them the revelation of tainted food sold by the Beef Trust and American Sugar Refining's long-continued system of customs swindles (in spite of its tariff favors and the enormous profits from monopoly prices), the company being compelled to make restitution of $2,134,000 to the government.[61]

But definite regulation developed slowly, antagonistic interests driving at different tangents. Two extremes jostled each other: "Off with their heads!" and "Let us alone!" Industrial combination represented economic progress, in spite of abuses and occasional inefficiency. Production by machinery inevitably led to larger technical units, more capital investment and combination, multiplying the output of goods. The abuses of combination were not in itself but in ownership and manipulation. Critics spoke of "restoring competition" as if nothing had happened in the economic world since the introduction of

Although affecting affiliated enterprises, the campaign for government regulation of corporate combinations did not at first directly affect the House of Morgan itself. But a direct offensive was inevitable, as the House of Morgan represented the system of financial centralization and control of industry, and the offensive materialized in the Money Trust investigation of 1912.

By this time the public mood was much more radical than when Theodore Roosevelt initiated his regulation campaign. In spite of government action, combinations were still arrogant and oppressive, while business depression sharpened labor and agrarian discontent, developed a decided drift toward socialism, and created a substantial middle-class liberal movement largely under Robert M. La Follette's inspiration. Every social transition sharpens class antagonisms and discontent. The campaign to regulate corporate combinations, necessary in the transition of Big Business to supremacy, merged in more radical proposals to democratize industry and government. Even Roosevelt, essentially conservative, was swept off his feet by the spirit of radical protest, aggressive reform and social idealism among the Progressives whose program he adopted to the strain of "We stand at Armageddon and we battle for the Lord!" (Roosevelt recovered after the campaign.) Increasing radicalization produced Republican defeat in the 1910 Congressional elections, the Roosevelt Progressive revolt, and Woodrow Wilson's election to the presidency in 1912.

This upflare of progressivism, representing the interests of small businessmen, the farmers and labor, emphasized the more radical aspects of the revolt against centralized industry and finance, proposing government action on corporate combinations to restore, in Wilson's words, "our old variety and freedom and individual energy of development." [78] Wilson urged the punishment of officers and not corporations in convictions of illegal practices, favored "liberating business" by restoring competition, and said in 1911: "The great monopoly in this

country is the money monopoly.... A great industrial nation is controlled by its credit. Our system of credit is concentrated ... in the hands of a few men ... who chill and check and destroy economic freedom."[79] The revolt against corporate combinations now converged on the "Money Trust."

Early in 1912 the House of Representatives decided to investigate the Money Trust, which primarily meant J. P. Morgan & Co. Again Morgan became a dominant campaign issue (as in 1896). At the Democratic convention William Jennings Bryan put through a resolution against "the nomination of any candidate for president who is the representative of or under obligations to J. Pierpont Morgan, Thomas F. Ryan, August Belmont, or any other member of the privilege-hunting or favor-seeking class" (instigating denunciation of Bryan by one delegate as a "money-grabbing, favor-seeking, office-chasing marplot").[80] The Money Trust investigation and its aftermath decided the forms and limitations of corporate regulation, readjustment and final conquest.

Read Message

From: loupnoir@bellatlantic.net <loupnoir@bellatlantic.net>

[add to contacts]

To: \Clay T. Whitehead\ <tom@cwx.com>
Cc:
Date: Thursday, February 19, 2004 06:47 pm
Subject: musings on technology

Beltway traffic has its benefits....

On the way home today I was thinking about what you said about radio originally being driven by the desire to sell the device, which I recalled reading about earlier. It occurred to me there seems to be a distinct parallel between what happened w/radios and with computer technology -- when radio first came out, it was presumed that the money would be made manufacturing the equipment, when ultimately it was the companies that developed and supplied content that became huge, far outstripping the profits from manufacturing.

Don't you think a case could be made that when computers first hit the market, the same mentality held? Companies like IBM thought they would reap profits by manufacturing machines, when the real money was made in the software. Sixty years later, we were still clinging to the concept of hard goods as opposed to intellectual property.

I hope I'm here to see the next technical revolution. I'll know where to place my bets....

Anyway, just a thought. And someday I'd like to hear about your role w/AT&T.....

See you --

Nanci

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Annual Report of the Federal Radio Commission to Congress

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ANNUAL REPORT

OF THE

FEDERAL RADIO COMMISSION

TO THE

CONGRESS OF THE UNITED STATES

FOR THE

FISCAL YEAR ENDED JUNE 30, 1927

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON
1927

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ANNUAL REPORT OF THE FEDERAL RADIO COMMISSION FOR THE FISCAL YEAR 1927

FEDERAL RADIO COMMISSION,
Washington, July 1, 1927.

To the CONGRESS OF THE UNITED STATES:

The Federal Radio Commission submits herewith its report for the fiscal year ended June 30, 1927.

The passage of the radio act of 1927 presented a situation without parallel in the history of American executive departments. A wholly new Federal body was called into being to deal with a condition which had become almost hopelessly involved during the months following July 8, 1926, when it had become clear that the Department of Commerce had no authority under the 1912 radio law to allocate frequencies, withhold radio licenses, or regulate power or hours of transmission. The new law itself was, of course, totally untested, and the Federal Radio Commission was called upon to administer it with no clear knowledge as to the limitations which might be created by subsequent court action.

The act embraces the whole field of radio communication, but public interest was concentrated almost wholly on the single section of it devoted to radio broadcasting. The problems of point-to-point radio communication, of radiotelegraphy, of marine wireless, of power transmission, etc., though of vast importance, did not present such an urgent need for immediate action as the utter confusion within the broadcasting band. Public opinion assumed that the prime purpose of the law in creating the Federal Radio Commission was the immediate establishment of a sound basis, in the interest of the radio broadcast listener, for the orderly development of American broadcasting.

For this reason the work of the Federal Radio Commission from its first meeting, on March 15, 1927, up to June 30, was devoted almost exclusively to clearing up the broadcasting situation. With the physical capacity of the available channels, or wave lengths, already far exceeded by the number of stations actually in operation, and with no provision in the law for the Federal acquisition or condemnation of broadcasting stations in order to reduce the total number, the commission found it necessary to evolve some plan whereby, without any unconstitutional exercise of arbitrary authority, the listening public could receive more dependable broadcasting service, and whereby a gradual and orderly development could be counted on to bring about a progressive reduction in radio interference.

The following record, taken largely from the orders and bulletins of the commission, outlines the steps whereby this plan was evolved and put into execution. These steps were, in brief, four: First, the determination of the best scientific opinion through a series of public

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hearings; second, the internal organization of the commission, handicapped as it was by lack of funds, to handle the enormous amount of documentary material which was required; third, the protection of the broadcasters against liability for unlicensed broadcasting until a suitable basis for the new licenses could be worked out; and, fourth, a complete new allocation of frequencies, power, and hours of operation for all of the existing 732 broadcasting stations to provide adequate local separation and a basis for the gradual elimination of distant interference.

Under the radio act of 1927 the Federal Radio Commission was formally organized on March 15, 1927, as follows:

Rear Admiral W. H. G. Bullard, of Media, Pa., commissioner from the second zone, chairman; Judge Eugene O. Sykes, of Jackson, Miss., commissioner from the third zone, vice chairman; O. H. Caldwell, of New York, N. Y., commissioner from the first zone; Henry A. Bellows, of Minneapolis, Minn., commissioner from the fourth zone; Col. John F. Dillon, of San Francisco, Calif., commissioner from the fifth zone.

Sam Pickard, chief of the radio division, Department of Agriculture, was engaged as acting secretary when the commission was organized. Mr. Pickard was made permanent secretary on April 20, 1927.

ASSIGNMENT OF COMMISSIONERS

Chairman Bullard took direct charge of the radio stations in the second zone, embracing Pennsylvania, Virginia, West Virginia, Ohio, Michigan, and Kentucky.

Commissioner Sykes took charge of the third zone, embracing North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma.

Commissioner Caldwell took charge of the first zone, embracing Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, District of Columbia, Porto Rico, and the Virgin Islands.

Commissioner Bellows took charge of the fourth zone, embracing Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas, and Missouri.

Commissioner Dillon took charge of the fifth zone, embracing Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Hawaii, and Alaska.

Due to the lack of funds, the commission was forced to open its offices at the Department of Commerce, where Secretary Hoover provided a suite of rooms formerly occupied by the Bureau of Navigation. It was possible to engage only a small office force, and it has been necessary to economize in every possible way.

When the Federal Radio Commission was inaugurated it found a chaotic condition prevailing in the radio field, for after Government control broke down in 1926 many broadcasters jumped their waves, seeking more desirable channels, regardless of their existing occupants. Even the channels reserved for Canada were appropriated, and split frequencies were used, with only a slight separation of from 1 to 5 kilocycles in many instances.

The problem confronting the commission was to try and bring order out of chaos by placing the 732 broadcasting stations on 89

wave lengths, so as not to create serious interference. The first act of the commission was to continue in force all radio amateur and ship licenses issued by the Department of Commerce and all coastal, point to point, technical, training, and experimental radio licenses, in order that attention might be concentrated on the pressing problems within the broadcasting band.

PUBLIC HEARINGS HELPFUL

For the purpose of providing opportunity for the presentation of general suggestions by the public and by qualified experts as to the methods for reducing interference within the broadcasting law, at its first meeting the commission arranged for a series of public hearings for March 29 to April 1, inclusive.

The subjects assigned for discussion were: Broadening the broadcasting band, limitation of power, reducing frequency separation, simultaneous broadcasting with the same frequency, chain broadcasting, division of time, consolidation of broadcasting service, limiting the members of broadcasting stations, and general discussion.

United opposition to widening the broadcasting band in order to accommodate more stations was expressed at the hearings by representatives of the radio art, science, and industry. Diverse views were presented regarding limitation of the power output, with the general opinion prevailing that this should be determined on the basis of area to be served by the respective stations. Stout opposition was registered also against reducing the frequency separation between channels from 10 to 7 kilocycles, while chain broadcasting in the main was indorsed. It was agreed that a division of time by stations is absolutely necessary to relieve to some extent the congestion on the ether channels.

PROMINENT PERSONS OFFER SUGGESTIONS

Among those who took part in the public hearings and made suggestions for the guidance of the commission were:

Paul B. Klugh, representing the National Association of Broadcasters.
Frank D. Scott, general counsel of the National Association of Broadcasters and the Radio Manufacturers' Association.
Jack Binns, treasurer of the Hazeltine Corporation.
R. H. Langley, treasurer of the Crosley Radio Corporation.
Dr. F. A. Kolster, Federal Telegraph Co. of California.
Dr. Alfred N. Goldsmith, chairman of the board of consulting engineers of the National Broadcasting Co.
C. Francis Jenkins, a noted inventor, of Washington, D. C.
Alfred P. Thom, jr., counsel for the American Railway Association.
George T. Stanton, chairman of committee No. 12, radio and wire carrier system, American Railway Association.
Lamden Kay, Atlanta, Ga., director of station operated by the Atlanta Journal.
L. P. F. Raycroft, vice president of National Electrical Manufacturers' Association.
Ray H. Manson, chief engineer, Stromberg-Carlson Telephone Manufacturing Co.
Robert H. Marriott, consulting engineer of New York, representing the Independent Wireless Telegraph Co.
L. W. Wallace, secretary of the American Engineering Council.
Paul Godley, radio engineer of Newark, N. J.
Samuel A. Waite, Worcester Telegram Publishing Co., Worcester, Mass.
L. C. F. Horle, Federal Radio Corporation, Buffalo, N. Y.
H. B. Hough, Fort Worth, Tex., radio announcer.

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Edgar H. Felix, representing Radio Broadcast Magazine.
M. P. Rice, General Electric Co., Schenectady, N. Y.
I. S. Bemis, American Telephone & Telegraph Co., New York, N. Y.
D. A. Beane, radio supervisor, Chicago, Ill.
Dr. J. H. Dellinger, Bureau of Standards.
K. B. Warner, secretary of American Radio Relay League, Hartford, Conn.
P. G. Andrews, representing Newcomb-Hawley (Inc.), St. Charles, Ill.
E. M. Terry, University of Wisconsin.
J. C. Jenson, educator, Lincoln, Nebr.
Edward M. Nockles, secretary of the Chicago Federation of Labor.
C. W. Horn, Westinghouse Electric Co.
G. W. Grignon, radio editor, Wisconsin News.
Alfred J. McCosker, L. Bamberger & Co., Newark, N. J.
Glenn J. Fairbrook, attorney, Seattle, Wash.
Arthur Batcheller, United States radio supervisor, New York, N. Y.
Louis Caldwell, attorney for the Chicago Tribune.
Franklin Ford, radio director, New York, N. Y.
H. C. Crowell, Moody Bible Institute, Chicago, Ill.
A. B. Church, radio engineer, Independence, Mo.
R. S. McBride, consulting engineer, Washington, D. C.
W. D. Jameson, attorney, Shenandoah, Iowa.
G. C. Furness, National Carbon Co., New York, N. Y.
P. A. Green, United States Radio Society.
Alfred E. Walter, managing director of National Electrical Manufacturers Association.
Morris L. Ernst, attorney for American Civil Liberties Union.
Elisha Hanson, attorney for American Newspaper Publishers' Association.
Stephen B. Davis, Solicitor for Department of Commerce.
Dr. T. B. Symonds, University of Maryland.

QUESTIONNAIRE SENT TO ALL APPLICANTS

One of the first acts of the commission was to prepare a comprehensive questionnaire, which was sent to all broadcasters, designed to get information on their stations, especially regarding the kind of public service rendered in the past and their plans for the future. All applicants for licenses were told new allocations would be based on frequencies expressed in kilocycles, proceeding by even tens from 540 kilocycles (representing 555.2 meters) to 1,500 kilocycles (representing 199.9 meters).

Based upon the recommendations made at the public hearings, it was decided by the commission that a separation of 10 kilocycles is absolutely necessary to prevent audible heterodyning of carrier waves.

CANADIAN CHANNELS CLEARED

When the commission assumed office there were 41 American stations on or overlapping the six wave lengths assigned to Canada, and they were summarily removed. To clear the Canadian channels, all broadcasters were notified that under the existing agreement with Canada the following channels will not be assigned for use by American broadcasters:

Wave length	Kilocycles
291.1	1,030
312.3	960
329.5	910
358.9	840
410.7	730
434.5	690

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On April 24, 1927, the commission granted temporary permits to all broadcasters who held a license, or an extension thereof, issued by the Secretary of Commerce under the act of 1912. That was done mainly to allow stations to operate without rendering their owners liable to the penalties provided by the radio act of 1927.

AIM AND PURPOSE OF TEMPORARY PERMITS

Explaining the aim and purpose of the temporary permits, the commission issued this statement:

Although the temporary permits to broadcasting stations now being issued by the Federal Radio Commission are designed chiefly to protect broadcasters who were licensed under the 1912 law from incurring the penalties provided by the 1927 act for operating without a license, they will also provide an immediate measure of real relief to the radio listeners. When the new law went into effect there were 129 broadcasting stations operating on frequencies outside of the regularly authorized scale.

Originally licenses were issued by the Department of Commerce to use frequencies on a decimal basis, thereby maintaining the necessary separation of 10 kilocycles between frequencies. After July 1, 1926, however, a considerable number of stations selected intermediate frequencies, realizing that the Department of Commerce had no power to prevent such action. Each station thus operating has created interference on three different wave lengths—on the one on which it is actually operated and on the nearest regular wave lengths above and below.

As no temporary permits are being issued for these intermediate frequencies, and as the Federal supervisors are being instructed to watch carefully for any violation of the terms of these permits, all of the 129 stations which have been creating interference on two wave lengths besides their own will within the next week or 10 days be operating on frequencies where they will create interference only with other stations on the same wave length. In many cases it has not been found practicable, on account of interference, to move the stations to the nearest authorized frequency, and accordingly many of them have been assigned to frequencies in less congested parts of the broadcasting band.

Furthermore, the temporary permits state the maximum permissible power, and in a number of cases, particularly where stations are located in congested residential districts, this maximum power is being materially cut down in the interests of the listening public. Thus, although the temporary permits do not represent any complete attempt to solve the broadcasting problem, which will begin with the issuing of short-time licenses as soon as possible after April 24, the commission believes that these temporary permits will in themselves bring about a certain amount of immediate and very desirable relief to the radio listeners of the entire country.

AN OPEN-DOOR POLICY ADOPTED

An "open-door" policy was agreed upon by the commission. Commissioner Bellows was named director of publicity, and twice a week he held conferences with the Washington correspondents. On these occasions Commissioner Bellows outlined as far as practical the plans of the commission and explained action already taken. The keen interest in the problems before the commission was evidenced by the large attendance at the press conferences. Chairman Bullard in explaining the views of the commission with relation to its contact with the public said on one occasion:

The commission has no desire to arrive at any conclusions without taking the public into its fullest confidence, and while its membership is limited by law to five members yet the commission would like to consider that really every listener and every broadcaster, whether owner or operator, is a potential member for submitting constructive ideas to keep the other channels clear that just

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as many stations may operate as possible. To use the words of a former President, the commission believes in "open covenants openly arrived at." The only motto we have is the doormat welcome, and there are no czars, as some newspapers like to suggest; we are all equals—the commission and the public—striving to solve many difficult problems and propitiate the ire of perhaps some disgruntled ones.

AN APPALLING RESPONSIBILITY

The spirit with which the commission approached its task was expressed by Commissioner Bellows in an address before the League of Women Voters at a dinner in Washington on April 29, 1927. At that time he said:

Congress has grasped the significance of radio as a vital force in American life and has recently enacted a law which in many ways is absolutely unique. I know of no other activity, conducted entirely through private enterprise, which has seemed to Congress so important and so complex in its problems as to require the creation of a new and separate branch of the Government exclusively for its regulation. Nor do I know of any other law which, like the radio act of 1927, sets up as the sole guide for the body charged with its administration the interest, convenience, or necessity of the public. That, in just four words, is what Congress has told us to do. We are to determine who shall and who shall not broadcast and how such broadcasting shall be carried on, simply in accordance with our conception of public interest, convenience, or necessity.

It is a rather appalling responsibility. The law tells us that we shall have no right of censorship over radio programs, but the physical facts of radio transmission compel what is, in effect, a censorship of the most extraordinary kind. A broadcasting station is in many ways akin to a newspaper, but with this fundamental difference there is no arbitrary limit to the number of different newspapers which may be published, whereas there is a definite limit, and a very low one, to the number of broadcasting stations which can operate simultaneously within the entire length and breadth of our country. This limit has not only been reached, it has been far overpassed; the demand from every section of the country is to cut down the number of broadcasting stations in the interests of the listening public.

What does this mean? It means that the Federal Radio Commission must say to this person, "You may broadcast," and to that person, "You may not broadcast; there is no room for you." It means, in actual practice, that we can not find suitable frequencies, or wave lengths, even for all of the stations already built and in operation, and that to several hundred applicants for new construction permits we can say only, "We are sorry, but we can see no present hope for you." We must say to John Doe, "You are rendering a service of great value in the interest, convenience, or necessity of the public, and you shall have a good wave length, plenty of time, and ample power," while we say to Richard Roe, "We find your service of less value to the public; so you shall have a poorer wave length, less time, and less power, or perhaps no wave length, time, or power at all."

HARD TO MEASURE CONFLICTING CLAIMS

We can not evade this responsibility, for it is the thing which Congress has told us we must do, and it is the thing which the people of America rightly demand shall be done. The variety of broadcasting service has become infinite: how shall we measure the conflicting claims of grand opera and religious services, of market reports and direct advertising, of jazz orchestras and lectures on the diseases of hogs?

It is for help in making such decisions, wisely and justly, that the Federal Radio Commission turns to you and to those who, like you, have the larger and truer vision of what radio can mean in our national life. Congress has said that we shall administer the radio law in the public interest; we in turn ask you to help us define public interest in such a way that this marvelous agency shall be free to play the great part it ought to play in building up and strengthening the understanding of our people.

Every broadcasting station exists for one sole purpose—the creation of public good will for its owners or for the sponsors of its programs. It will broadcast

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whatever it believes will best create and maintain that good will. Very rightly, Congress has held that the broadcaster shall not be subject to governmental dictation as to the character of the material he sends out: the Federal Radio Commission, under the present law, can not and will not interfere with any broadcaster's right to control and censor his own programs. In that matter his relations are not with the Government, not with the commission, but with you. It is for you, the listeners, not for us, to censor his programs. It is for you to tell him when he is rendering, or failing to render, real service to the public, and you may be sure that he will listen to your voices.

PUBLIC MUST GUARD FREEDOM OF AIR

Above all, it is for you, not for us of the commission, to safeguard the so-called freedom of the air. Here is a problem which, because you are primarily interested in radio as a means of political education, touches you very closely. You would be quick to see the danger if there could be only a fixed and rather small number of newspapers and magazines published in the United States; you would rightly fear that the newcomer, the nonconformist, the representative of the minority, would have small chance to present his ideas to the public. This is just the situation which exists in broadcasting and which inevitably must continue to exist unless some fundamental change in the science of radio transmission comes about as the result of new discovery, to make possible a totally unforeseen increase in the number of stations which can broadcast simultaneously.

The radio law tells us that we shall not fix any condition "which shall interfere with the right of free speech by means of radio communication," and yet, if radio communication of any kind is to be possible at all we must sharply limit the number of broadcasting stations. The safeguarding of that right of free speech which is essential to intellectual growth lies in the hands of the broadcasters themselves, and, ultimately, in yours, for it is your good will that the broadcasters are seeking. If they and you do not so safeguard it—if you do not make it clear that your understanding of public interest, convenience, and necessity involves a very broad conception of the obligations of the broadcaster to his listeners—then it may be that Congress will feel that there is need for some amendment to the present radio law, an amendment calling for such Government regulation of radio programs as would manifestly be deplorable if it can possibly be avoided.

LISTENERS TO DECIDE FUTURE COURSE OF RADIO

The future of radio broadcasting is in your hands. The broadcasters exist solely to serve you as listeners; they charge you nothing and they ask only your good will. Congress, recognizing the full significance of the problem, has created this new Federal body, of which I have the honor to be a member, solely to administer the law in your interests. The vast scope of this new medium of transmitting ideas passes all comprehension. Your imaginations can not conceive, even though guesswork may boldly state numbers, of the audience which may listen to a single voice. And it is for you to say whether this potent agency shall be used rightly or wrongly. It is for you to say whether it shall degenerate into a mere plaything or develop into one of the greatest forces in the molding of our entire civilization. It is for you to establish close relations with the broadcasters who serve your communities and to show them that it is to their advantage to use their stations for the highest type of public service.

It is as such a mighty power for linking together all parts of our national life, for making better and wiser citizens of our great country, that the Federal Commission conceives of broadcasting. But we can do only what you tell us you want done. Our present problem is to clear the channels of radio communication; yours is to say what commodities of human thought, of reason, and of art shall be borne on those channels to millions of listeners. Our task is not an easy one; yours is, I believe, in the long run, even harder. But I know the broadcasters, many of them, well, and I know that they are eager for your help and cooperation. It is the glory of democracy that the will of the people rules, and to-day the Federal Radio Commission, created to serve the people of the United States, asks of you that you will do your utmost to create a demand for that kind of radio service which will make our country a better and happier and finer place in which to live.

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POWER REDUCED IN RESIDENTIAL DISTRICTS

Owing to constant complaints of interference caused by broadcasting stations using too much power within residential sections, the commission issued an order on May 4, 1927, reducing the power of many stations in the large cities. To improve radio reception in New York, Chicago, and other large cities the commission decided that a separation of 50 kilocycles is necessary between local stations. All allocations were made on that basis.

From the beginning of its existence the commission has been literally swamped, almost daily, with letters and telegrams from listeners and broadcasters. At first the listeners confined themselves to suggestions as to ways and means to improve radio reception. Later many of them were enlisted by certain broadcasters in their fight for special consideration in the allotment of waves and power.

"FANS" TELL HOW TO SOLVE PROBLEMS

Some of the proposals of the "fans" were very helpful to the commission, while others were fantastical and impractical. For the guidance of the commission, Ira L. Grimshaw, of the Department of Commerce, spent several weeks reading 3,000 letters and telegrams. His digest was very illuminating. In brief, it follows:

The following suggestions seem to have been made with considerable regularity and unanimity:

1. Whatever plan is followed, every station must remain exactly on its assigned wave length. A crystal or other control should be required to accomplish this purpose.

2. Stations logically should be classified into the big and the little, or the high power and the low power—the local and the national—the general and the special. The higher-grade stations should have greater range and signal strength and more desirable frequencies upon which to operate. They should be subjected to the minimum of regulation by the Government. The other class should take what is left. They should be purely secondary in everything but regulation.

3. Pirates should be given no consideration. Fundamentally they are persona non grata with the rank and file of radio listeners. They simply interfere with good programs.

4. Directly advertising wares must be either entirely prohibited or greatly restricted. It has been suggested daylight hours only be used for advertising directly.

5. All transmitters should be located outside of cities and congested areas, particularly outside of residential districts.

6. Telegraphic interference is either ruining or seriously jeopardizing broadcast reception in many specific localities. Foreign ships and wandering amateurs are charged with this high misdemeanor.

7. Chain broadcasting is either the greatest blessing or curse of broadcasting. The conclusion is dependent entirely upon either the location of the listener or his particular taste. It is noteworthy that but few suggest the elimination of chain broadcasting. Hours of operations and power limitations and specific frequencies come in for appropriate attention when discussing this subject.

NEW ALLOCATION OF FREQUENCIES REDUCES INTERFERENCE

After spending considerable time and thought on formulating important policies and basic principles the members of the commission mapped out a new allocation of frequencies and power which was announced on May 24 to become effective June 15, 1927.

The members of the commission found it possible to reassign the stations to frequencies which would, in their judgment, serve as a

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sound basis for the development of good broadcasting to all sections of the country with comparatively little interference and heterodyning.

In working out the new national traffic system for broadcasting the commission's first consideration was to devise ways and means to improve radio reception throughout the United States. While large groups of stations—more than 100—were operating in two centers, New York and Chicago, they were given secondary consideration and were not allowed to dominate the situation.

Practically all stations were given new assignments, and listeners were obliged to scrap their old logs. It was found necessary to place several stations on the same wave and to provide for a division of time, in many instances, in order to give all qualified broadcasters a place on the air. For the most part the broadcasters accepted the new assignments with good grace and showed a fine spirit of cooperation. A few of them demurred and instituted court proceedings. But after a more careful study two of them announced that their suits had been withdrawn.

SHORT-TERM LICENSES ISSUED

In announcing the issuance of the new licenses the commission made the following statement:

The new licenses are all for 60 days, during which period the new allocations can be tested by actual practice. The law provides that any broadcaster who is dissatisfied with his allocation may have a public hearing before the commission, and at such a hearing his claim for a specific frequency or power will be considered in all its relations.

The commission recognizes that no scheme of reallocation which does not at the very outset eliminate at least 400 broadcasting stations can possibly put an end to interference. Accordingly, it regards the new allocations, not as creating in any sense an ideal broadcasting situation, but as providing for the first time a sound basis for radio service to the listener. With the cooperation of the public and the broadcasters, the commission believes that it will be possible to improve conditions progressively by an orderly process of actual experience.

Until such experience has been gained, both the listeners and the broadcasters are urged to exercise patience. The listener will, of necessity, have to relog his receiving set and may find considerable difficulty in locating all the stations he desires to hear. The broadcasters will doubtless find that many of their listeners are at first somewhat bewildered by the changes in frequencies. It is the belief of the commission, however, that within a very few weeks the material reduction of local or regional interference, the redistribution of frequencies so as to clear most of the broadcasting channels, and the decrease of power for stations in residential districts will combine to render radio reception in general very much better than it has been in a long time.

Special attention is called to the fact that the commission has no unused frequencies to allocate. Every broadcasting channel is filled to its apparent capacity and in some cases possibly overcrowded. Accordingly, any listener who wants a different allocation of frequency or power for his favorite station, or any broadcaster who seeks increased facilities for service, must be prepared to show specifically what other station should be required to give up its frequency or have its power reduced in order to make possible the desired reallocation.

CONSOLIDATION OF STATIONS

In an address before the National Press Club, on April 30, 1927, which was widely broadcast, Chairman Bullard said:

One of the plans whereby the commission hopes and expects to help the public to get better broadcasting service, and at the same time to bring about

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far greater economy and efficiency in broadcasting service, is that of encouraging the consolidation of radio stations through the use of two or more sets of call letters for a single transmitter. This plan has actually been put into operation in a number of places, with admirable results, and the commission is definitely encouraging it as one way to provide better service for the listening public.

In reviewing the work of the commission up to that time, Chairman Bullard said:

When the commission began its work less than six weeks ago, it was apparent that the first requisite was complete and accurate information as to the actual broadcasting situation. The license applications on file with the Department of Commerce merely showed what the applicants asked for; they did not give any adequate information as to just what power and time each station was actually using, and in some cases they did not even indicate whether the station was actually in operation. The sworn statements made by the broadcasters in their new applications for license, together with the applications for construction permits and the detailed reports of the Federal radio supervisors, have given the commission a complete and accurate picture of the broadcasting situation as it really is to-day, and it is on the basis of this picture that the commission is going ahead with the task of reassigning frequencies, power, and time. Remember, that all this assembling of information had to be done by an entirely new body, with no previously existing staff and with very limited funds. Considering the difficulties which had to be overcome, the commission feels that these six weeks have shown a very satisfactory amount of progress and give the listeners just reason to hope and believe that within the next month or two the commission will have gone far toward solving the problem of untangling the traffic on the channels of radio communication.

Although the temporary permits now in force were issued primarily to save the broadcasters themselves from liabilities under the law, they have resulted in a most gratifying improvement in broadcasting conditions. The six waves reserved for Canada have been entirely cleared, and thus an international radio problem has been very largely solved. One hundred and twenty-nine stations which were operating on "split kilocycle frequencies"—that is to say, on wave lengths where each station caused heterodyning both above and below itself—have been reallocated. Maximum power allowances have been materially cut down for stations located within congested residential districts and in cases where acute interference was reported. Although the definite nation-wide reallocation has yet to be carried out, the progress thus far made is most encouraging and helpful.

PRELIMINARY WORK OF THE COMMISSION

Reviewing the preliminary work of the commission while discussing "The big job yet to be done in radio," Commissioner Caldwell, in an address in Chicago June 11, 1927, said in part:

We have had about six years of radio broadcasting. It was in 1921 that the first station (KDKA) started operating, and soon other stations followed. From 1922 to the middle of 1926 radio grew and grew in popularity, sales mounted, and a great new industry was in the making. Then something happened.

In July, 1926, just 10 months ago, the Attorney General of the United States rendered his famous opinion that the Secretary of Commerce, under the radio law of 1912, was without power to control the broadcasting situation or to assign wave lengths. Thus, after five years of orderly development, control was off. Beginning with August, 1926, anarchy reigned in the ether.

As the result many stations jumped without restraint to new wave lengths which suited them better, regardless of the interference which they might thus be causing to other stations. Proper separation between established stations was destroyed by other stations coming in and camping in the middle of any open spaces they could find, each interloper thus impairing reception of three stations—his own and two others.

Instead of the necessary 50-kilocycle separation between stations in the same community, the condition soon developed where separations of 20 and 10 kilocycles, and even 8, 5, and 2 kilocycles, existed. Under such separations, of

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course, stations were soon wildly blanketing each other while distracted listeners were assailed with scrambled programs.

Wave lengths assigned to Canada were violated, in spite of repeated warnings from the Government and even personal appeals from members of the President's Cabinet that national good faith and international good will were at stake. Meanwhile 250 new stations had injected themselves into the already overcrowded situation and undertook to find perches on which to light, without respect to the existing stations.

Some of the older stations also jumped their power, increasing 5 to 10 times their output, and as a result delivering terrific heterodyne interference to distant stations that had been previously undisturbed under the orderly radio pattern developed by the former supervising authorities and heterodyne interference between broadcasters on the same wave length became so bad at many points on the dial that the listener might suppose instead of a receiving set he had a peanut roaster with assorted whistles. Indeed, every human ingenuity and selfish impulse seemed to have been exerted to complicate the tangle in the ether.

NEW LAW BROUGHT RELIEF

On February 23 of this year Congress passed the new radio law of 1927, putting great powers of radio control in the hands of a commission appointed by the President to serve full time for one year in clearing up the radio confusion. For the first 60 days of the law, or until April 23, no penalties were enforceable; but on April 24, when fines up to $5,000 and penitentiary sentences up to five years became effective, the commission actively put into effect its plans and operations to clear out the interference.

The first steps were (*a*) to transfer all stations to authorized channels on "even tens" of kilocycles, (*b*) to clear the Canadian waves, and (*c*) to combine interfering stations and tuck them in wherever possible in the spectrum, in order to keep them in operation without interfering with those stations who had remained faithfully on their assigned channels. This was accomplished for the period of the temporary permits, beginning April 24.

REALLOCATION OF ALL STATIONS

During the meantime, with the public given partial relief, it was possible for the commission to make a careful study of the situation, and by painstaking planning arrange for the second big step—a reallocation of all stations in the best interests of the listening public. When this reallocation took effect listeners found that (*a*) for each locality local stations were well distributed along the dial, with minimum separations of 50 kilocycles; (*b*) stations were recognized in terms of position and time on the basis of their demonstrated capacity to serve the public; and (*c*) heterodyne interference between distant stations, in general, diminished. These improvements have been accomplished by repacking the channels according to an orderly plan, actually increasing the capacity of the 89 channels available, in much the same way that a lumber bin which appeared full when lumber had been carelessly thrown into it from all directions can hold considerably more when the lumber is packed in an orderly fashion and the former wasted open spaces avoided.

Sixty-day licenses issued for June 15 to August 15, and the operation of the new allocation will be carefully watched in the light of actual experience during this period, so that necessary changes can be made where interference is experienced. Such actual experience is necessary in view of the irregular and unpredictable transmission in different directions which almost every station sends out. If the ordinary station's radiation went out equally in all directions, making the station's interference area a big circle, the task of fitting stations together without interference at minimum distances would be simple; but as every listener knows, some stations are unaccountably heard for many miles in one or more directions while being shut off by natural "barriers" in other directions. Advantage must be taken of all these curious unpredictable phenomena and adjustments made before the new station set-up will be really working at its best. Here only actual experience, and not engineering theory, can be the guide. The commission is therefore likely to continue issuing only short-term licenses of 60 to 90 day duration on through the winter months, in order to test out the transmission conditions during the cold-weather period of greatest radio effectiveness, before any long-term licenses are granted.

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PUBLIC HEARING DOCKET

Under General Order No. 12, the commission held 16 hearings before June 30, 1927—the period covered by this report—of broadcasters who were dissatisfied with the allocation as to frequency, power, or time division granted them under the 60-day licenses, effective June 15. Because of his legal training and experience, Commissioner Sykes presided at the hearings at the request of Chairman Bullard. The first hearing was held on May 27, 1927, upon application of Station WJAZ, Mount Prospect, Ill., which sought a change in frequency from 1,140 kilocycles to 770 kilocycles. That application was denied. The other hearings, with decisions of the commission, follow:

May 31.—Station WGS, New York, asked for a change in frequency from 1,170 kilocycles to 710 kilocycles. Denied. Station WGL, New York, assigned 1,170 kilocycles, sought 1,070 kilocycles. Denied.

June 1.—Station WDWM, Newark, N. J., licensed to operate on 1,270 kilocycles, sought 1,070 kilocycles. Application denied.

June 2.—Station WGES, Chicago, assigned 1,240 kilocycles, sought 920 kilocycles. Denied.

June 8.—Station WGCP, Newark, N. J., assigned 1,070 kilocycles, sought 810 kilocycles. Denied. Station WLWL, New York, assigned 1,020 kilocycles, sought 810 kilocycles. Approved.

June 10.—Station WBT, Charlotte, N. C., assigned 500 watts power, sought 1,000 watts. Application approved for period 7 a. m. to 7 p. m. Station WGBI, Scranton, Pa., assigned 100 watts, sought 500 watts. Granted 250 watts.

June 14.—Station WBBR, Brooklyn, Assigned 1,170 kilocycles, sought 660 kilocycles. Denied.

June 21.—Station WCGU, Sea Gate, New York Harbor, assigned 1,420 kilocycles, sought 970 kilocycles. Denied. Station WBRS, Brooklyn, N. Y., assigned 1,420 kilocycles, sought 760 kilocycles. Denied.

June 22.—Station WBNY, New York, assigned 1,270 kilocycles, sought 1,070 kilocycles. Denied. Station NHAP, New York, assigned 1,270 kilocycles, sought 1,070 kilocycles. Denied. Station WGBB, Freeport, N. Y., applied for permission to remain at assigned frequency of 1,220 kilocycles. Granted.

GENERAL ORDERS ADOPTED

General orders adopted by the commission outline succinctly the policies agreed upon as the most effective way to put into effect the radio act of 1927. Those approved up to July 1, 1927, follow:

EXTENSION OF AMATEUR AND SHIP LICENSES

[General Order No. 1, March 15, 1927]

The Federal Radio Commission, under authority of the act of February 23, 1927, hereby extends the force and effect of all radio amateur and ship licenses issued by the Department of Commerce from and after this date until further orders from this commission, this extension to be of the same force and effect as though new licenses had been issued by this commission, subject to such general regulations as this commission may from time to time issue.

PUBLIC HEARINGS

[General Order No. 2, March 15, 1927]

For the purpose of providing opportunity for the presentation to the Federal Radio Commission of general suggestions as to methods for reducing interference within the broadcasting band, but not for hearing individual claims or complaints, the Federal Radio Commission hereby sets the dates of Tuesday,

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March 29, Wednesday, March 30, Thursday, March 31, and Friday, April 1, for public hearings, to be held in the offices of the Federal Radio Commission, Commerce Building, Washington, beginning each morning at 10 o'clock.

EXTENSION OF LICENSES

[General Order No. 3, March 29, 1927]

All coastal, point-to-point, technical and training, and experimental radio-station licenses in force on the 22d day of February, 1927, are hereby extended until the further order of the commission.

BROADCASTING FREQUENCY BAND

[General Order No. 4, April 5, 1927]

In view of the manifest inconvenience to the listening public which would result from any immediate widening of the frequency band devoted to radio broadcasting, the Federal Radio Commission will not at this time allocate to broadcasting stations frequencies other than those between 550 and 1,500 kilocycles (545.1 to 199.9 meters), except on specific request of such stations. It believes, however, that the band between 1,500 and 2,000 kilocycles (199.9 to 149.9 meters) should, so far as may be practicable, be held open for experimental work in broadcasting and allied forms of radio service, to the end that, with the further development of the art, this band may be eventually made available for broadcasting, whether for the ear or the eye, if it shall prove particularly well adapted to such type of service to the public.

EXTENSION OF BROADCAST LICENSES

[General Order No. 5, April 5, 1927]

On Sunday, April 24, at 11.59 p. m., terminates the period of 60 days during which, under section 40 of the radio act of 1927, no holder of a license or an extension thereof issued by the Secretary of Commerce under the act of August 13, 1912, is subject to the penalties provided in the radio act of 1927 for operating a station without a license.

The Federal Radio Commission will issue a temporary permit to operate a radio broadcasting station, good only until final action is taken by the commission on the application for license, to each holder of a license or an extension thereof from the Secretary of Commerce under the act of August 13, 1912, whose application for a license under the radio act of 1927 has been received by the Federal Radio Commission on or before April 24, 1927, and such temporary permit shall, until withdrawn, be considered as having the force and effect of a license in so far as the penalties provided in the radio act of 1927 are concerned.

After April 24, 1927, any person operating a radio broadcasting station otherwise than under the authority of such a temporary permit or a license issued by the Federal Radio Commission will be deemed by the commission to be operating a broadcasting station without a license.

LICENSES FOR PORTABLE STATIONS

[General Order No. 6, April 26, 1927]

Since the exact location of any radio broadcasting transmitter is an essential feature of the license, the Federal Radio Commission, as already announced, will not consider any application for a broadcasting license, except for a very limited period of time, in which the permanent location of the transmitter is not specified. However, for the purpose of enabling so-called portable stations which were duly licensed under the law of 1912 to render service to the public during the spring and summer months, the Federal Radio Commission will issue to such stations licenses for not more than 120 days, to operate with not more than 100 watts power output, and with frequencies of 1,470 and 1,490 kilocycles only. Any such permit may be revoked by the commission at any time if it be shown that the operation of the station thus licensed is causing interference prejudicial to the public interest.

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ONLY HALF KILOCYCLE DEVIATION ALLOWED

[General Order No. 7, April 28, 1927]

The Federal Radio Commission hereby fixes a maximum of one-half kilocycle as the extreme deviation from authorized frequency which will be permitted to any broadcasting station operating under permit or license issued under the terms of the radio act of 1927. The Department of Commerce is hereby requested to notify its proper agents immediately of this order and to direct them to report promptly any apparent violations thereof. Maintenance of the assigned frequency within the limits herein prescribed is the duty of each radio broadcasting station, and violation of this order will be deemed by the Federal Radio Commission cause for revocation of license under section 14 of the radio act of 1927.

To facilitate the execution of this order, each radio broadcasting station is hereby directed, effective 12.01 a. m., local time, Monday, May 9, to announce twice each day, at the beginning and end of its program, that it is broadcasting on a frequency of —— kilocycles by authority of the Federal Radio Commission.

PLAN TO CHECK FREQUENCIES

[General Order No. 8, May 5, 1927]

For the purpose of facilitating a more accurate check on station frequencies both by the Federal radio supervisors of the Department of Commerce and by the public, each radio broadcasting station, licensed under the radio act of 1927, is hereby directed to announce its call letters and location as frequently as may be practicable while it is broadcasting, and in any event not less than once during each 15 minutes of transmission.

It is understood, however, that this requirement is waived when such announcement would interrupt a single consecutive speech or musical number, and in such cases the announcement of the call letters and location shall be made at the beginning and end of such number.

This order becomes effective at 12.01 a. m. Wednesday, May 11, 1927, and will remain in force until further notice.

TO PREVENT SPECULATION IN RADIO STATIONS

[General Order No. 9, May 13, 1927]

Section 12 of the Federal radio act provides that no station license shall be transferred or assigned, either voluntarily or involuntarily, without the consent in writing of the licensing authorities.

It is hereby ordered that any person desiring to purchase a broadcasting station shall make application for a new license to the commission on the application blank forms. In addition thereto, the proposed seller or assignor of the station must also write a letter to the commission to the effect that he desires to sell or transfer this station to the applicant for the above-named license and wishes a license issued to this applicant in place and instead of himself.

The commission may either grant or refuse the license or grant with modification as to frequency and power.

DAYTIME POWER INCREASED IN SPECIAL CASES

[General Order No. 10, May 18, 1927]

For the purpose of facilitating wider and better reception of daytime service programs, such as those of educational and religious institutions, civic organizations, and distributors of market and other news, the Federal Radio Commission will consider applications from holders of broadcasting station licenses for the use, between the hours of 6 a. m. and 6 p. m. local time only, of a larger power output than is authorized by such licenses. Applications for this daytime privilege must be made to the commission in writing and shall specify the maximum daytime power to be used, the approximate daytime broadcasting schedule, and the reasons why, in the applicant's estimation, the granting of such privilege would be in the interest, convenience, or necessity of the public.

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In each case where such privilege is granted the Federal Radio Commission will notify the radio division of the Department of Commerce, requesting this division, through the Federal radio supervisors, to check carefully the use of power by such station, both day and night. Any failure to revert to the power specified in the license between 6 p. m. and 6 a. m. will be held cause not only for immediate withdrawal of the daytime power privilege but for reduction of the maximum power authorized for use at night.

TERMINATES TEMPORARY PERMITS

[General Order No. 11, May 21, 1927]

The Federal Radio Commission hereby orders that all temporary permits to operate radiobroadcasting stations under the terms of the radio act of 1927 shall terminate at 3 o'clock, local standard time, on the morning of Wednesday, June 1, 1927, and that thereafter all radiobroadcasting stations subject to the provisions of the radio act of 1927 shall be operated solely in accordance with the provisions of the licenses issued as of June 1, 1927, by the Federal Radio Commission.

RULES FOR HEARINGS BEFORE COMMISSION

[General Order No. 12, May 26, 1927]

In all cases in which the 60-day license, effective June 1, offered the licensee is not in accord with the application, the applicant is hereby notified that the commission has not determined that public interest, convenience, or necessity would be served by the granting of such application.

Any applicant for license who is dissatisfied with the allocation as to frequency, power, or time division granted him in the 60-day license issued by the commission which is effective June 1, and who desires a hearing upon his application, may notify the commission in writing of such desire by June 15, 1927.

The commission will thereupon fix a time and place for such hearing. Pending the hearing and the decision thereon by the commission, the applicant will be permitted to broadcast only under the terms and conditions and in accordance with his 60-day license issued by the commission.

The applicant for license may introduce at the hearing before the Federal Radio Commission any witnesses he may desire. In addition thereto, he may introduce any affidavits relating to relevant facts.

The fact in issue is whether or not public interest, convenience, or necessity will be served by granting to the applicant a license upon the wave length or frequency requested in the application, or in the application as amended in the request for hearing, and with the power therein requested and the place for said station therein designated.

All persons interested in the granting or refusal of the application and the frequency therein applied for, including other licensees authorized to use the frequency requested, licensees upon frequencies where interference is claimed, other applicants for the same frequency, and representatives of the public in general, may appear and will be heard upon any relevant matters. The commission may likewise introduce witnesses or affidavits.

All applications for licenses or copies thereof on file with the commission may be introduced in evidence at the hearing. All temporary permits, temporary licenses or copies thereof, and other records on file with either the Federal Radio Commission or the Department of Commerce may be introduced in evidence at the hearing without any further verification.

The witnesses introduced at the hearing, before testifying will be sworn by a member of the commission. The commission will pass upon the relevancy and competency of the testimony offered to be introduced before it. After the conclusion of the hearing and within a reasonable time the commission will render its decision in writing.

The testimony and proceedings at these hearings will be taken down by shorthand reporters designated by the commission, so that the entire record of the proceedings and hearings may be preserved in case of appeal, as provided by section 16 of the radio act of 1927. All hearings provided for by this order will be public and will be held at the offices of the Federal Radio Commission in Washington.

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NEW LICENSES MADE EFFECTIVE JUNE 15, 1927

[General Order No. 13, May 28, 1927]

In consideration of the fact that a certain amount of time is required in many cases for making the changes of equipment required by changes of station frequency and for securing suitable control equipment to maintain frequency without serious variation, the Federal Radio Commission hereby amends General Order No. 11, dated May 21, 1927, to read as follows: "The Federal Radio Commission hereby orders that all temporary permits to operate radio broadcasting stations under the terms of the radio act of 1927 shall terminate at 3 o'clock, local standard time, on the morning of Wednesday, June 15, 1927, and that thereafter all radio broadcasting stations subject to the provisions of the radio act of 1927 shall be operated solely in accordance with the provisions of the licenses issued as of June 1, 1927, by the Federal Radio Commission."

The Federal Radio Commission hereby orders that all licenses for the period of 60 days, issued as of June 1, 1927, shall not become effective until 3 o'clock, local standard time, on the morning of Wednesday, June 15, 1927, and shall continue in effect unless previously revoked or modified by order of the commission, for a period of 60 days after June 15, 1927.

TESTIMONY AS GUIDE TO COMMISSION

[General Order No. 14, June 3, 1927]

Testimony introduced at any hearing relative to any particular station or any particular frequency will, when relevant, be considered as testimony by the commission at any of its subsequent hearings. Applicants may examine these records.

INTERFERENCE HEARINGS

[General Order No. 15, June 7, 1927]

For the purpose of providing an orderly method for the reduction and eventual elimination of interference between radio broadcasting stations operating on the same or on closely adjacent frequencies, the Federal Radio Commission announces the following procedure: "At any time after July 15, 1927, any radio broadcasting station operating under license from the Federal Radio Commission may file with the commission an affidavit certifying that unreasonable and injurious interference with its signals is being caused by the simultaneous operation of another radio broadcasting station, the name or call letters of which must be specified in the affidavit. The affidavit must likewise specify not less than two occasions on which such interference was observed, with the name and address of the person making each of such observations, the type of receiving set used, and the date and hour thereof. On receipt of such affidavit, and if in the judgment of the Federal Radio Commission the interference complained of is actually unreasonable and injurious to the affiant, the commission will appoint a date for a hearing, at its convenience, will notify thereof the parties interested, and on the basis of the testimony presented at such hearing will order such changes of frequency, power, or hours of operation as may appear best to serve public interest, convenience, or necessity."

Respectfully,

W. H. G. BULLARD,
Chairman Federal Radio Commission.

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Text of the August 13, 1912 "An Act to regulate radio communication". This was the first act in the United States to require radio stations to be licenced--the earlier ship acts only required that certain ships to have radio equipment installed. [The layout for this page is based on the July 27, 1914 edition of Radio Laws and Regulations of the United States, published by the Washington Government Printing Office].

[PUBLIC--NO. 264.]
[S. 6412.]

An Act To regulate radio communication, approved August 13, 1912.

Radio act.

License.

Penalty.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a license, revocable for cause, in that behalf granted by the Secretary of Commerce and Labor upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the same State: *Provided,* That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a license shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce and Labor. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanor, and on conviction thereof shall be punished by a fine not exceeding five hundred dollars, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

License form.

SEC. 2. That every such license shall be in such form as the Secretary of Commerce and Labor shall determine and shall contain the restrictions, pursuant to this Act, on and subject to which the license is granted; that every such license shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorized for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorize the use of any apparatus for radio communication in any other station than that specified. Every such license shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and

treaties of the United States. Every such license shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorize the use or control of any such station or apparatus by any department of the Government, upon just compensation to the owners.

Operators.

Suspension of license.

Penalty.

Temporary permit.

SEC. 3. That every such apparatus shall at all times while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labor. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States, or any one of them, or who shall fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishments and penalties herein prescribed, may suffer the suspension of the said license for a period to be fixed by the Secretary of Commerce and Labor not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanor, and on conviction thereof shall be punished by a fine of not more than one hundred dollars or imprisonment for not more than two months; or both, in the discretion of the court, for each and every such offense: *Provided,* That in case of emergency the Secretary of Commerce and Labor may authorize a collector of customs to issue a temporary permit, in lieu of a license, to the operator on a vessel subject to the radio ship Act of June twenty-fourth, nineteen hundred and ten.

Regulations.

SEC. 4. That for the purpose of preventing or minimizing interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labor through the collectors of customs and other officers of the Government as other regulations herein provided for.

The Secretary of Commerce and Labor may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

Experimental stations.

The Secretary of Commerce and Labor may grant special temporary licenses to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

NORMAL WAVE LENGTH.

First. Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed six hundred meters or it shall exceed one thousand six hundred meters. Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wave lengths, one of three hundred meters

and one of six hundred meters, as required by the international convention in force: *Provided,* That the Secretary of Commerce and Labor may, in his discretion, change the limit of wave length reservation made by regulations first and second to accord with any international agreement to which the United States is a party.

OTHER WAVE LENGTHS.

Second. In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths: *Provided,* That they do not exceed six hundred meters or that they do exceed one thousand six hundred meters: *Provided further,* That the character of the waves emitted conforms to the requirements of regulations third and fourth following.

USE OF A "PURE WAVE."

Third. At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed ten per centum of that in the greatest.

USE OF A "SHARP WAVE."

Fourth. At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

USE OF "STANDARD DISTRESS WAVE."

Fifth. Every station on shipboard shall be prepared to send distress calls on the normal wave length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave length.

SIGNAL OF DISTRESS.

Sixth. The distress call used shall be the international signal of distress ●●●▬▬▬

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USE OF "BROAD INTERFERING WAVE" FOR DISTRESS SIGNALS.

Seventh. When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

DISTANCE REQUIREMENT FOR DISTRESS SIGNALS.

Eighth. Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations fifth and sixth with sufficient power to enable them to be received by day over sea a distance of one hundred nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

"RIGHT OF WAY" FOR DISTRESS SIGNALS.

Ninth. All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are completed.

REDUCED POWER FOR SHIPS NEAR A GOVERNMENT STATION.

Tenth. No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

INTERCOMMUNICATION.

Eleventh. Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio system adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period not less than two minutes, with the receiver tuned to receive messages of three hundred meter wave lengths.

DIVISION OF TIME.

Twelfth. At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations can not be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labor may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

GOVERNMENT STATIONS TO OBSERVE DIVISION OF TIME.

Thirteenth. The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

USE OF UNNECESSARY POWER.

Fourteenth. In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

GENERAL RESTRICTIONS ON PRIVATE STATIONS.

Fifteenth. No private or commercial station not engaged in the transaction of bona fide commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding two hundred meters, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labor contained in the license of that station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of one hundred dollars or twenty-five dollars, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter has been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

SPECIAL RESTRICTIONS IN THE VICINITIES OF GOVERNMENT STATIONS.

Sixteenth. No station of the character mentioned in regulation fifteenth situated within five nautical miles of a naval or military station shall use a transmitting wave length exceeding two hundred meters or a transformer input exceeding one-half kilowatt.

SHIP STATIONS TO COMMUNICATE WITH NEAREST SHORE STATIONS.

Seventeenth. In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this can not be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

LIMITATIONS FOR FUTURE INSTALLATIONS IN VICINITIES OF GOVERNMENT STATIONS.

Eighteenth. No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the following naval or military stations, to wit: Arlington, Virginia; Key West, Florida; San Juan, Porto Rico; North Head and Tatoosh Island, Washington; San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of nineteen hundred and six and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to, and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of nineteen hundred and six and future international conventions and treaties to which the United States may be a party shall not be so established as to insure a constant service day and night without interruption, and in all localities wherever or whenever such service shall not be maintained by a commercial shore station within one hundred nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of Government business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts from such radiograms shall be covered

into the Treasury as miscellaneous receipts.

SECRECY OF MESSAGES.

Nineteenth. No person or persons engaged in or having knowledge of the operation of any station or stations, shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorized agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than two hundred and fifty dollars or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

PENALTIES.

For violation of any of these regulations, subject to which a license under sections one and two of this Act may be issued, the owner of the apparatus shall be liable to a penalty of one hundred dollars, which may be reduced or remitted by the Secretary of Commerce and Labor, and for repeated violations of any of such regulations, the license may be revoked.

For violation of any of these regulations, except as provided in regulation nineteenth, subject to which a license under section three of this Act may be issued, the operator shall be subject to a penalty of twenty-five dollars, which may be reduced or remitted by the Secretary of Commerce and Labor, and for repeated violations of any such regulations, the license shall be suspended or revoked.

Interference. SEC. 5. That every license granted under the provisions of this Act for the operation or use or apparatus for radio communication shall prescribe that the operator thereof shall not willfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanor, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed five hundred dollars or imprisonment for not to exceed one year, or both.

SEC. 6. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

False signals. SEC. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than two thousand five hundred dollars or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offense, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than one thousand dollars or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offense.

Foreign vessels. SEC. 8. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections four and seven of this Act and so much of section five as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

SEC. 9. That the trial of any offense under this Act shall be in the district in which it is

committed, or if the offense is committed upon the high seas or out of the jurisdiction of any particular State or district the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 10. That this Act shall not apply to the Philippine Islands.

SEC. 11. That this Act shall take effect and be in force on and after four months from its passage.

Approved, August 13, 1912.

• United States Early Radio History > Early Government Regulation

Radio News Magazine Aug. 1928

Next

The cover of the August, 1928 issue of *Radio News* magazine shows a young couple viewing "radio movies" at home. In terminology coined by publisher Hugo Gernsback, a "radio movie" meant the broadcast of a pre-recorded movie image, whereas true "television" meant broadcasting a live image.

The feature article describes a scheme that uses scanning-disk technology to broadcast image from a strip of conventional movie film. On the broadcasting end, a strong light is shined at a scanning disk with 48 lenses. A "pinhead" of light passes through the holes in the disk, traveling through the frames of a movie film. The image is thus scanned into 48 separate horizontal "strips" during each fifteenth of a second. Each scanned image is received by a photocell and then transmitted.

On the receiving side, the signal is decoded with a complicated apparatus, including a four-segment ring with contact brushes, which turns off and on the four elements of a special cylindrical neon tube. The tube sits inside a large rotating cylinder that uses 48 quartz rods to conduct the light from the neon tube out through the large cylinder to a mirror set at a 45-degree angle. The image reflected from the mirror passes through a magnifying lens about ten inches in diameter. In the cover illustration, you can see the top of the rotating cylinder underneath the small mirror on the top of the receiving device.

It's interesting to compare this device with the scanning-disk TV illustrated in the November, 1928 Radio News issue. Both scheme use a scanning disk on the broadcast end to slice the image into horizontal strips. They differ in the means by which they reconstruct the image on the receiver side. The November, 1928 scheme uses a single neon tube placed behind a scanning disk which must be synchronized with the transmitting disk. The "radio movie" device described in this issue uses a four-element neon tube, which shines through a cylinder pierced with holes instead of shining through a disk pierced with holes.

Synchronism, as well as mechanical complexity, was the bugaboo of scanning-disk schemes. If the receiver is not synch with the transmitter, then the image is garbled, of course. The article somewhat glosses over this crucial point, noting that synchronism was easily obtained during the demonstration, since both the transmitter and receiver were on the same power line. From that, we can infer that the devices were timed using the pulses of their A.C. power supplies, although no means of doing so appears in the illustrations.

Other articles in this issue include:

- What to Expect of Television, by Hugo Gernsback
- Getting the Vote to Radio
- Rain, Rays, and Radio (fiction)
- Why the Weather Affects Radio Reception
- Some Odd Uses for Vacuum Tubes
- Radio Novelties From Abroad and Home (pictorial)
- What Is a Good Loud Speaker?
- A Two-Tube Reflex Receiver of Simple Construction (construction)
- A Booster Unit for the Browning-Drake (construction)
- A Screen-Grid Short-Wave Receiver (construction)
- Better Direct-Coupled A.F. Amplifiers

The Radio Act of 1927

Public Law No. 632, February 23, 1927, 69th Congress. An Act for the regulation of radio communications, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That this Act is intended to regulate all forms of interstate and foreign radio transmissions and communications within the United States, its Territories and possessions; to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by individuals, firms, or corporations, for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. That no person, firm, company, or corporation shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States, or from the District of Columbia to another place in the same Territory, possession or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or Possession of the United States; or from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel of the United States; or (f) upon any aircraft or other mobile stations within the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

SEC. 2. For the purposes of this Act, the United States is divided into five zones, as follows: The first zone shall embrace the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, the District of Columbia, Porto Rico, and the Virgin Islands; the second zone shall embrace the States of Pennsylvania, Virginia, West Virginia, Ohio, Michigan, and Kentucky; the third zone shall embrace the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma; the fourth zone shall embrace the States of Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas, and Missouri; and the fifth zone shall embrace the States of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, the Territory of Hawaii, and Alaska.

SEC. 3. That a commission is hereby created and established to be known as the Federal Radio Commission, hereinafter referred to as the commission, which shall be composed of five commissioners appointed by the President, by and with the advice and consent of the Senate, and one of whom the President shall designate as chairman: *Provided,* That chairmen thereafter elected shall be chosen by the commission itself.

Each member of the commission shall be a citizen of the United States and an actual resident citizen of a State within the zone from which appointed at the time of said appointment. Not more than one commissioner shall be appointed from any zone. No member of the commission shall be financially interested in the manufacture or sale of radio apparatus or in the transmission or operation of radiotelegraphy, radio telephony, or radio broadcasting. Not more than three commissioners shall be members of the same political party.

The first commissioners shall be appointed for the terms of two, three, four, five, and six years, respectively, from the date of the taking effect of this Act, the term of each to be designated by the President, but their successors shall be appointed for terms of six years, except that any person chosen to fill a vacancy shall be appointed only for the unexpired term of the commissioner whom he shall succeed.

The first meeting of the commission shall be held in the city of Washington at such time and place as the chairman of the commission may fix. The commission shall convene thereafter at such times and places as a majority of the commission may determine, or upon call of the chairman thereof.

The commission may appoint a secretary, and such clerks, special counsel, experts, examiners, and other employees as it may from time to time find necessary for the proper performance of its duties and as from time to time may be appropriated for by Congress.

The commission shall have an official seal and shall annually make a full report of its operations to the Congress.

The members of the commission shall receive a compensation of $10,000 for the first year of their service, said year to date from the first meeting of said commission, and thereafter a compensation of $30 per day for each day's attendance upon sessions of the commission or while engaged upon work of the commission and while traveling to and from such sessions, and also their necessary traveling expenses.

SEC. 4. Except as otherwise provided in this Act, the commission, from time to time, as public convenience, interest, or necessity requires, shall--

(a) Classify radio stations;

(b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;

(c) Assign bands of frequencies or wave lengths to the various classes of stations, and assign frequencies or wave lengths for each individual station and determine the power which each station shall use and the time during which it may operate;

(d) Determine the location of classes of stations or individual stations;

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the wave lengths, authorized power, in the character of emitted signals, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, in the judgment of the commission, such changes will promote public convenience or interest or will serve public necessity or the provisions of this Act will be more fully complied with;

(g) Have authority to establish areas or zones to be served by any station;

(h) Have authority to make special regulations applicable to radio stations engaged in chain broadcasting;

(i) Have authority to make general rules and regulations requiring stations to keep such records of programs, transmissions of energy, communications, or signals as it may deem desirable;

(j) Have authority to exclude from the requirements of any regulations in whole or in part any radio station upon railroad rolling stock, or to modify such regulations in its discretion;

(k) Have authority to hold hearings, summon witnesses, administer oaths, compel the production of books, documents, and papers and to make such investigations as may be necessary in the performance of its duties. The commission may make such expenditures (including expenditures for rent and personal services at the seat of government and elsewhere, for law books, periodicals, and books of reference, and for printing and binding) as may be necessary for the execution of the functions vested in the commission and, as from time to time may be appropriated for by Congress. All expenditures of the commission shall be allowed and paid upon the presentation of itemized vouchers therefor approved by the chairman.

SEC. 5. From and after one year after the first meeting of the commission created by this Act, all the powers and authority vested in the commission under the terms of this Act, except as to the revocation of licenses, shall be vested in and exercised by the Secretary of commerce; except that thereafter the commission stall have power and jurisdiction to act upon and determine any and all matters brought before it under the terms of this section.

It shall also be the duty of the Secretary of Commerce--

(A) For and during a period of one year from the first meeting of the commission created by this Act, to immediately refer to the commission all applications for station licenses or for the renewal or modification of existing station licenses.

(B) From and after one year from the first meeting of the commission created by this Act, to refer to the commission for its action any application for a station license or for the renewal or modification of any existing station license as to the granting of which dispute, controversy, or conflict arises or against the granting of which protest is filed within ten days after the date of filing said application by any party in interest and any application as to which such reference is requested by the applicant at the time of filing said application.

(C) To prescribe the qualifications of station operators, to classify them according to the duties to be performed, to fix the forms of such licenses, and to issue them to such persons as he finds qualified.

(D) To suspend the license of any operator for a period not exceeding two years upon proof sufficient to satisfy him that the licensee (a) has violated any provision of any Act or treaty binding on the United States which the Secretary of commerce or the commission is authorized by this Act to administer or by any regulation made by the commission or the Secretary of Commerce under any such Act or treaty; or (b) has failed to carry out the lawful orders of the master of the vessel on which he is employed; or (c) has willfully damaged or permitted radio apparatus to be damaged; or (d) has transmitted superfluous radio communications or signals or radio communications containing profane or obscene words or language; or (e) has willfully or maliciously

interfered with any other radio communications or signals.

(E) To inspect all transmitting apparatus to ascertain whether in construction and operation it conforms to the requirements of this Act, the rules and regulations of the licensing authority, and the license under which it is constructed or operated.

(F) To report to the commission from time to time any violations of this Act, the rules, regulations, or orders of the commission, or of the terms or conditions of any license.

(G) To designate call letters of all stations.

(H) To cause to be published such call letters and such other announcements and data as in his judgment may be required for the efficient operation of radio stations subject to the jurisdiction of the United States and for the proper enforcement of this Act.

The Secretary may refer to the commission at any time any matter the determination of which is vested in him by the terms of this Act.

Any person, firm, company, or corporation, any State or political division thereof aggrieved or whose interests are adversely affected by any decision, determination, or regulation of the Secretary of Commerce may appeal therefrom to the commission by filing with the Secretary of Commerce notice of such appeal within thirty days after such decision or determination or promulgation of such regulation. All papers, documents, and other records pertaining to such application on file with the Secretary shall thereupon be transferred by him to the commission. The commission shall hear such appeal de novo under such rules and regulations as it may determine.

Decisions by the commission as to matters so appealed and as to all other matters over which it has jurisdiction shall be final, subject to the right of appeal herein given.

No station license shall be granted by the commission or the Secretary of Commerce until the applicant therefor shall have signed a waiver of any claim to the use of any particular frequency or wave length or of the ether as against the regulatory powers of the United States because of the previous use of the same, whether by license or otherwise.

SEC. 6. Radio stations belonging to and operated by the United States shall not be subject to the provisions of sections 1, 4, and 5 of this Act. All such Government stations shall use such frequencies or wave lengths as shall be assigned to each or to each class by the President. All such stations, except stations on board naval and other Government vessels while at sea or beyond the limits of the continental United States, when transmitting any radio communication or signal other than a communication or signal relating to Government business shall conform to such rules and regulations designed to prevent interference with other radio stations and the rights of others as the licensing authority may prescribe. Upon proclamation by the President that there exists war or a threat of war or a state of public peril or disaster or other national emergency, or in order to preserve the neutrality of the United States, the President may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations within the jurisdiction of the United States as prescribed by the licensing authority, and may cause the closing of any station for radio communication and the removal therefrom of its apparatus and equipment, or he may authorize the use of control of any such station and/or its

apparatus and equipment by any department of the Government under such regulations as he may prescribe, upon just compensation to the owners. Radio stations on board vessels of the United States Shipping Board or the United States Shipping Board Emergency Fleet Corporation or the Inland and Coastwise Waterways Service shall be subject to the provisions of this Act.

SEC. 7. The President shall ascertain the just compensation for such use or control and certify the amount ascertained to Congress for appropriation and payment to the person entitled thereto. If the amount so certified is unsatisfactory to the person entitled thereto, such person shall be paid only 75 per centum of the amount and shall be entitled to sue the United States to recover such further sum as added to such payment of 75 per centum which will make such amount as will be just compensation for the use and control. Such suit shall be brought in the manner provided by paragraph 20 of section 24, or by section 145 of the Judicial Code, as amended.

SEC. 8. All stations owned and operated by the United States, except mobile stations of the Army of the United States, and all other stations on land and sea, shall have special call letters designated by the Secretary of Commerce.

Section 1 of this Act shall not apply to any person, firm, company, or corporation sending radio communications or signals on a foreign ship while the same is within the jurisdiction of the United States, but such communications or signals shall be transmitted only in accordance with such regulations designed to prevent interference as may be promulgated under the authority of this Act.

SEC. 9. The licensing authority, if public convenience interest, or necessity will be served thereby, subject to the limitations of this Act, shall grant to any applicant therefor a station license provided for by this Act.

In considering applications for licenses and renewals of licenses, when and in so far as there is a demand for the same, the licensing authority shall make such a distribution of licenses, bands of frequency of wave lengths, periods of time for operation, and of power among the different States and communities as to give fair, efficient, and equitable radio service to each of the same.

No license granted for the operation of a broadcasting station shall be for a longer term than three years and no license so granted for any other class of station shall be for a longer term than five years, and any license granted may be revoked as hereinafter provided. Upon the expiration of any license, upon application therefor, a renewal of such license may be granted from time to time for a term of not to exceed three years in the case of broadcasting licenses and not to exceed five years in the case of other licenses.

No renewal of an existing station license shall be granted more than thirty days prior to the expiration of the original license.

SEC. 10. The licensing authority may grant station licenses only upon written application therefor addressed to it. All applications shall be filed with the Secretary of Commerce. All such applications shall set forth such facts as the licensing authority by regulation may prescribe as to the citizenship, character, and financial, technical, and other qualifications of the applicant to operate the station; the ownership and location of the proposed station and of the stations, if any, with which it is proposed to communicate; the frequencies or wave lengths and the power desired to be used; the hours of the day or other periods of time during which it is proposed to operate the station; the purposes for which the station is to be used; and such other information as it may require. The licensing authority at any time after the filing of such original application and during the term of any such license may require from an applicant or licensee further written statements of fact to enable it to determine whether such original application should be granted or denied or such license revoked. Such application and/or such statement of fact shall be signed by the applicant and/or licensee under oath or

affirmation.

The licensing authority in granting any license for a station intended or used for commercial communication between the United States or any Territory or possession, continental or insular, subject to the jurisdiction of the United States, and any foreign country, may impose any terms, conditions, or restrictions authorized to be imposed with respect to submarine-cable licenses by section 2 of an Act entitled "An Act relating to the landing and the operation of submarine cables in the United States," approved May 24, 1921.

SEC. 11. If upon examination of any application for a station license or for the renewal or modification of a station license the licensing authority shall determine that public interest, convenience, or necessity would be served by the granting thereof, it shall authorize the issuance, renewal, or modification thereof in accordance with said finding. In the event the licensing authority upon examination of any such application does not reach such decision with respect thereto, it shall notify the applicant thereof, shall fix and give notice of a time and place for hearing thereon, and shall afford such applicant an opportunity to be heard under such rules and regulations as it may prescribe.

Such station licenses as the licensing authority may grant shall be in such general form as it may prescribe, but each license shall contain, in addition to other provisions, a statement of the following conditions to which such license shall be subject:

(A) The station license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies or wave length designated in the license beyond the term thereof nor in any other manner than authorized therein.

(B) Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of this Act.

(C) Every license issued under this Act shall be subject in terms to the right of use or control conferred by section 6 hereof.

In cases of emergency arising during the period of one year from and after the first meeting of the commission created hereby, or on applications filed during said time for temporary changes in terms of licenses when the commission is not in session and prompt action is deemed necessary, the Secretary of Commerce shall have authority to exercise the powers and duties of the commission, except as to revocation of licenses, but all such exercise of powers shall be promptly reported to the members of the commission, and any action by the Secretary authorized under this paragraph shall continue in force and have effect only until such time as the commission shall act thereon.

SEC. 12 Any station license shall be revocable by the commission for false after the granting thereof such license shall not be transferred in any manner, either voluntarily or involuntarily, to (a) any alien or the representative of any alien; (b) to any foreign government, or the representative thereof; (c) to any company, corporation, or association organized under the laws of any foreign government; (d) to any company, corporation, or association of which any officer or director is an alien, or of which more than one-fifth of the capital stock may be voted by aliens or their representatives or by a foreign government or representative thereof, or by any company, corporation, or association organized under the laws of a foreign country.

The station license required hereby, the frequencies or wave length or lengths authorized to be used by the licensee, and the rights therein granted shall not be transferred, assigned, or in any manner, either voluntarily or involuntarily, disposed of to any person, firm, company, or corporation without the consent in writing of the

licensing authority.

SEC. 13 The licensing authority is hereby directed to refuse a station license and/or the permit hereinafter required for the construction of a station to any person, firm, company, or corporation, or any subsidiary thereof, which has been finally adjudged guilty by a Federal court of unlawfully monopolizing or attempting unlawfully to monopolize, after this Act takes effect, radio communication, directly or indirectly, through the control of the manufacture or sale of radio apparatus, through exclusive traffic arrangements, or by any other means or to have been using unfair methods of competition. The granting of a license shall not estop the United States or any person aggrieved from proceeding against such person, firm, company, or corporation for violating the law against unfair methods of competition or for a violation of the law against unlawful restraints and monopolies and/or combinations, contracts, or agreements in restraint of trade, or from instituting proceedings for the dissolution of such firm, company, or corporation.

SEC. 14. Any station license shall be revocable by the commission for false statements either in the application or in the statement of fact which may be required by section 10 hereof, or because of conditions revealed by such statements of fact as may be required from time to time which would warrant the licensing authority in refusing to grant a license on an original application, or for failure to operate substantially as set forth in the license, for violation of or failure to observe any of the restrictions and conditions of this Act, or of any regulation of the licensing authority authorized by this Act or by a treaty ratified by the United States, or whenever the Interstate Commerce Commission, or any other Federal body in the exercise of authority conferred upon it by law, shall find and shall certify to the commission that any licensee bound so to do, has failed to provide reasonable facilities for the transmission of radio communications, or that any licensee has made any unjust and unreasonable charge, or has been guilty of any discrimination, either as to charge or as to service or has made or prescribed any unjust and unreasonable classification, regulation, or practice with respect to the transmission of radio communications or service: *Provided,* That no such order of revocation shall take effect until thirty days' notice in writing thereof, stating the cause for the proposed revocation, has been given to the parties known by the commission to be interested in such license. Any person in interest aggrieved by said order may make written application to the commission at any time within said thirty days for a hearing upon such order, and upon the filing of such written application said order of revocation shall stand suspended until the conclusion of the hearing herein directed. Notice in writing of said hearing shall be given by the commission to all the parties known to it to be interested in such license twenty days prior to the time of said hearing. Said hearing shall be conducted under such rules and in such manner as the commission may prescribe. Upon the conclusion hereof the commission may affirm, modify, or revoke said orders of revocation.

SEC. 15 All laws of the United States relating to unlawful restraints and monopolies and to combinations, contracts, or agreements in restraint of trade are hereby declared to be applicable to the manufacture and sale of and to trade in radio apparatus and devices entering into or affecting interstate or foreign commerce and to interstate or foreign radio communications. Whenever in any suit, action, or proceeding, civil or criminal, brought under the provisions of any of said laws or in any proceedings brought to enforce or to review findings and orders of the Federal Trade Commission or other governmental agency in respect of any matters as to which said commission or other governmental agency is by law authorized to act, any licensee shall be found guilty of the violation of the provisions of such laws or any of them, the court, in addition to the penalties imposed by said laws, may adjudge, order, and/or decree that the license of such licensee shall, as of the date the decree or judgment becomes finally effective or as of such other date as the said decree shall fix, be revoked and that all rights under such license shall thereupon cease: *Provided, however,* That such licensee shall have the same right of appeal or review as is provided by law in respect of other decrees and judgments of said court.

SEC. 16 Any applicant for a construction permit, for a station license, or for the renewal or modification of an existing station license whose application is refused by the licensing authority shall have the right to appeal from said decision to the Court of Appeals of the District of Columbia; and any licensee whose license is

revoked by the commission shall have the right to appeal from such decision of revocation to said Court of Appeals of the District of Columbia or to the district court of the United States in which the apparatus licensed is operated, by filing with said court, within twenty days after the decision complained of is effective, notice in writing of said appeal and of the reasons therefor.

The licensing authority from whose decision an appeal is taken shall be notified of said appeal by service upon it, prior to the filing thereof, of a certified copy of said appeal and of the reasons therefor. Within twenty days after the filing of said appeal the licensing authority shall file with the court the originals or certified copies of all papers and evidence presented to it upon the original application for a permit or license or in the hearing upon said order of revocation, and also a like copy of its decision thereon and a full statement in writing of the facts and the grounds for its decision as found and given by it. Within twenty days after the filing of said statement by the licensing authority either party may give notice to the court of his desire to adduce additional evidence. Said notice shall be in the form of a verified petition stating the stating the nature and character of said additional evidence, and the court may thereupon order such evidence to be taken in such manner and upon such terms and conditions as it may deem proper.

At the earliest convenient time the court shall hear, review, and determine the appeal upon said record and evidence, and may alter or revise the decision appealed from and enter such judgment as to it may seem just. The revision by the court shall be confined to the points set forth in the reasons of appeal.

SEC. 17. After the passage of this Act no person, firm, company, or corporation now or hereafter directly or indirectly through any subsidiary, associated, or affiliated person, firm, corporation, or agent, or otherwise, in the business of transmitting and/or receiving for hire energy, communications, or signals by radio in accordance with the terms of the license issued under this Act, shall by purchase, lease, construction, or otherwise, directly or indirectly, acquire, own, control, or operate any cable or wire telegraph or telephone line or system between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other assets of any such cable, wire, telegraph, or telephone line or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States or in the District of Columbia and any place in any foreign country, or unlawfully to create monopoly in any line of commerce; nor shall any person, firm, company, or corporation now or hereafter engaged directly or indirectly through any subsidiary, associated, or affiliated person, company, corporation, or agent, or otherwise, in the business of transmitting and/or receiving for hire messages by any cable, wire, telegraph, or telephone line or system (a) between any place in any State Territory, or possession of the United States or in the District of Columbia, and any place in any other State, Territory, or possession of the United States, or the District of Columbia, and any place in any foreign country, by purchase, lease, construction, or otherwise, directly or indirectly acquire, own, control, or operate any station or the apparatus therein, or any system for transmitting and/or receiving radio communications or signals between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other capital share or any interest in the physical property and/or other assets of any such radio station, apparatus, or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or unlawfully to create monopoly in any line of commerce.

SEC. 18. If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station, and the licensing authority shall make rules and regulations to carry this provision into effect: *Provided,* That such licensee shall have no power of censorship over the material broadcast under the provisions of this paragraph. No obligation is hereby imposed upon any licensee to allow

the use of its station by any such candidate.

SEC. 19. All matter broadcast by any radio station for which service, money, or any other valuable consideration is directly or indirectly paid, or promised to or charged or accepted by, the station so broadcasting, from any person, firm, company, or corporation, shall, at the time the same is so broadcast, be announced as paid for or furnished, as the case may be, by such person, firm, company, or corporation.

SEC. 20. The actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder. No person shall operate any such apparatus in such station except under and in accordance with an operator's license issued to him by the Secretary of Commerce.

SEC. 21. No license shall be issued under the authority of this Act for the operation of any station the construction of which is begun or is continued after this Act takes effect, unless a permit for its construction has been granted by the licensing authority upon written application therefor. The licensing authority may grant such permit if public convenience, interest, or necessity will be served by the construction of the station. This application shall set forth such facts as the licensing authority by regulation may prescribe as to the citizenship, character, and the financial, technical, and other ability of the applicant to construct and operate the station, the ownership and location of the proposed station and of the station or stations with which it is proposed to communicate, the frequencies and wave length or wave lengths desired to be used, the hours of the day or other periods of time during which it is proposed to operate the station, the purpose for which the station is to be used, the type of transmitting apparatus to be used, the power to be used, the date upon which the station is expected to be completed and in operation, and such other information as the licensing authority may require. Such application shall be signed by the applicant under oath or affirmation.

Such permit for construction shall show specifically the earliest and latest dates between which the actual operation of such station is expected to begin, and shall provide that said permit will be automatically forfeited if the station is not ready for operation within the time specified or within such further time as the licensing authority may allow, unless prevented by causes not under the control of the grantee. The rights under any such permit shall not be assigned or otherwise transferred to any person, firm, company, or corporation without the approval of the licensing authority. A permit for construction shall not be required for Government stations, amateur stations, or stations upon mobile vessels, railroad rolling stock, or aircraft. Upon the completion of any station for the construction or continued construction for which a permit has been granted, and upon it being made to appear to the licensing authority that all the terms, conditions, and obligations set forth in the application and permit have been fully met, and that no cause or circumstance arising or first coming to the knowledge of the licensing authority since the granting of the permit would, in the judgment of the licensing authority, make the operation of such station against the public interest, the licensing authority shall issue a license to the lawful holder of said permit for the operation of said station. Said license shall conform generally to the terms of said permit.

SEC. 22. The licensing authority is authorized to designate from time to time radio stations the communications or signals or which, in its opinion, are liable to interfere with the transmission or reception of distress signals of ships. Such stations are required to keep a licensed radio operator listening in on the wave lengths designated for signals of distress and radio communications relating thereto during the entire period the transmitter of said station is in operation.

SEC. 23. Every radio station on shipboard shall be equipped to transmit radio communications or signals of distress on the frequency or wave length specified by the licensing authority, with apparatus capable of transmitting and receiving messages over a distance of at least one hundred miles by day or night. When sending radio communications or signals of distress and radio communications relating thereto the transmitting

set may be adjusted in such a manner as to produce a maximum of radiation irrespective of the amount of interference which may thus be cause.

All radio stations, including Government stations and stations on board foreign vessels when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress, shall cease all sending on frequencies or wave lengths which will interfere with hearing a radio communication or signal of distress, and, except when engaged in answering or aiding the ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused with the radio communications or signals relating thereto, and shall assist the vessel in distress, so far as possible, by complying with its instructions.

SEC. 24. Every shore station open to general public service between the coast and vessels at sea shall be bound to exchange radio communications or signals with any ship station without distinction as to radio systems or instruments adopted by such stains, respectively, and each station on shipboard shall be bound to exchange radio communications or signals with any other station on shipboard without distinction as to radio systems or instruments adopted by each station.

SEC. 25 At all places where Government and private or commercial radio stations on land operate in such close proximity than interference with the work of Government stations can not be avoided when they are operating simultaneously such private or commercial stations as do interfere with the transmission or reception of radio communications or signals by the Government stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time.

The Government stations for which the above-mentioned division of time is established shall transmit radio communications or signals only during the first fifteen minutes of each hour, local standard time, except in case of signals or radio communications relating to vessels in distress and vessel requests for information as to course, location, or compass direction.

SEC. 26. In all circumstances, except in the case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired.

SEC. 27. No person receiving or assisting in receiving any radio communication shall divulge or publish the contents, substance, purport, effect, or meaning thereof except through authorized channels of transmission or reception to any person other than the addressee, his agent, or attorney, or to a telephone, telegraph, cable, or radio station employed or authorized to forward such radio communication to its destination, or to proper accounting or distributing officers of the various communicating centers over which the radio communication may be passed, or to the master of a ship under whom he is serving, or in response to a subpoena issued by a court of competent jurisdiction, or on demand of other lawful authority; and no person not being authorized by the sender shall intercept any message and divulge or publish the contents, substance, purport, effect, or meaning of such intercepted message to any person; and no person not being entitled thereto shall receive or assist in receiving any radio communication and use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto; and no person having received such intercepted radio communication or having become acquainted with the contents, substance, purport, effect, or meaning of the same or any part thereof, or use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto: *Provided,* That this section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication broadcasted or transmitted by amateurs or others for the use of the general public or relating to ships in distress.

SEC. 28. No person, firm, company, or corporation within the jurisdiction of the United States shall knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent signal of distress, or communication relating thereto, nor shall any broadcasting station rebroadcast the program or any part thereof of another broadcasting station without the express authority of the originating station.

SEC. 29. Nothing in this Act shall be understood or construed to give the licensing authority the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the licensing authority which shall interfere with the right of free speech by means of radio communications. No person within the jurisdiction of the United States shall utter any obscene, indecent, or profane language by means of radio communications.

SEC. 30. The Secretary of the Navy is hereby authorized unless restrained by international agreement, under the terms and conditions and at rates prescribed by him, which rates shall be just and reasonable, and which upon complaint, shall be subject to review and revision by the Interstate Commerce Commission, to use all radio stations and apparatus, wherever located, owned by the United States and under the control of the Navy Department (a) for the reception and transmission of press messages offered by any newspaper published in the United States, its Territories or possessions, or published by citizens of the United States in foreign countries, or by any press association of the United States, and (b) for the reception and transmission of private commercial messages between ships, between ship and shore, between localities in Alaska and between Alaska and the continental United States: *Provided,* That the rates fixed for the reception and transmission of all such messages, other than press messages between the Pacific coast of the United States, Hawaii, Alaska, the Philippine Islands, and the Orient, and between the United States and the Virgin Islands, shall not be less than the rates charged by privately owned and operated stations for like messages and service: *Provided further,* That the right to use such stations for any of the purposes named in this section shall terminate and cease as between any countries or localities or between any locality and privately operated ships whenever privately owned and operated stations are capable of meeting the normal communication requirements between such countries or localities or between any locality and privately operated ships, and the licensing authority shall have notified the Secretary of the Navy thereof.

SEC. 31. The expression "radio communication" or "radio communications" wherever used in this Act means any intelligence, message, signal, power, pictures, or communication of any nature transferred by electrical energy from one point to another without the aid of any wire connecting the points from and at which the electrical energy is sent or received and any system by means of which such transfer of energy is effected.

SEC. 32. Any person, firm, company, or corporation failing or refusing to observe or violating any rule, regulation, restriction, or condition made or imposed by the licensing authority under the authority of this Act or of any international radio convention or treaty ratified or adhered to by the United States, in addition to any other penalties provided by law, upon conviction thereof by a court of competent jurisdiction, shall be punished by a fine of not more than $500 for each and every offense.

SEC. 33. Any person, firm, company, or corporation who shall violate any provision of this Act, or shall knowingly make any false oath or affirmation in any affidavit required or authorized by this Act, or shall knowingly swear falsely to a material matter in any hearing authorized by this Act, upon conviction thereof in any court of competent jurisdiction shall be punished by a fine of not more than $5,000 or by imprisonment for a term of not more than five years or both for each and every such offense.

SEC. 34. The trial of any offense under this Act shall be in the district in which it is committed; or if the offense is committed upon the high seas, or out of the jurisdiction of any particular State or district, the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 35. This Act shall not apply to the Philippine Islands or to the Canal Zone. In international radio matters the Philippine Islands and the Canal Zone shall be represented by the Secretary of State.

SEC. 36. The licensing authority is authorized to designate any officer or employee of any other department of the Government on duty in any Territory or possession of the United States other than the Philippine Islands and the Canal Zone, to render therein such services in connection with the administration of the radio laws of the United States as such authority may prescribe: *Provided,* That such designation shall be approved by the head of the department in which such person is employed.

SEC. 37. The unexpended balance of the moneys appropriated in the item for "wireless communication laws," under the caption "Bureau of Navigation" in Title III of the Act entitled "An Act making appropriations for the Departments of State and Justice and for the judiciary, and for the Departments of Commerce and Labor, for the fiscal year ending June 30, 1927, and for other purposes," approved April 29, 1926, and the appropriation for the same purposes for the fiscal year ending June 30, 1928, shall be available both for expenditures incurred in the administration of this Act and for expenditures for the purposes specified in such items. There is hereby authorized to be appropriated for each fiscal year such sums as may be necessary for the administration of this Act and for the purposes specified in such item.

SEC. 38. If any provision of this Act or the application thereof to any person, firm, company, or corporation, or to any circumstances, is held invalid, the remainder of the Act and the application of such provision to other persons, firms, companies, or corporations, or to other circumstances, shall not be affected thereby.

SEC. 39. The Act entitled "An Act to regulate radio communication," approved August 13, 1912, the joint resolution to authorize the operation of Government-owned radio stations for the general public, and for other purposes, approved June 5, 1920, as amended, and the joint resolution entitled "Joint resolution limiting the time for which licenses for radio transmission may be granted, and for other purposes," approved December 8, 1926, are hereby repealed.

Such repeal, however, shall not affect any act done or any right accrued or any suit or proceeding had or commenced in any civil cause prior to said repeal, but all liabilities under said laws shall continue and may be enforced in the same manner as if committed; and all penalties, forfeitures, or liabilities incurred prior to taking effect hereof, under any law embraced in, changed, modified, or repealed by this Act, may be prosecuted and punished in the same manner and with the same effect as if this Act had not been passed.

Nothing in this section shall be construed as authorizing any person using or operating any apparatus for the transmission of radio energy or radio communications or signals to continue such use except under and in accordance with this Act and with a license granted in accordance with the authority hereinbefore contained.

SEC. 40. This Act shall take effect and be in force upon its passage and approval, except that for and during a period of sixty days after such approval no holder of a license or an extension thereof issued by the Secretary of Commerce under said Act of August 13, 1912, shall be subject to the penalties provided herein for operating a station without the license herein required.

SEC. 41. This Act may be referred to and cited as the Radio Act of 1927.

Approved, February 23, 1927.

Source: Barnouw, Erik: "A Tower in Babel", New York, Oxford University Press, 1966.

Note to SEC. 12: There appears to be an error in the Barnouw book used as the source for this document. In the original, this section is headed "SEC. 14", and the first line, ending with "for false", appears to be the wrong beginning for this section. It is the first line of section 14. It is shown here as in Barnouw, except that it is numbered as section 12.

1967	Pirate Radio Free Harlem, New York City, begins transmitting.	Links
1967	Pirate Radio Pegasus starts broadcasting off New Zealand.	Links
1967	Pirate Radio Station 333 (Radio Britain) ship breaks down.	Links
1967	Pirate radio stations Radio 270, Radio London, Radio Ireland, Radio Scotland & Radio Swinging Holland go off the air	Links
1967	Pirate Radio UKGM (England) closes down.	Links
1968	After 5 years Russia once again jams 'Voice of America' radio.	Links
1968	Anti-Zionist clandestine cadio 'Voice of El Assifa' starts transmitting.	Links
1968	The Communist clandestine radio 'Voice of Iraqi People' has its final transmission.	Links
1968	Pirate Radio Atlantis South, in England, begins test transmissions.	Links
1968	Pirate Radio Brumble of Northern England 1st heard.	Links
1968	Pirate Radio Free London, begins transmitting.	Links
1968	Pirate Radio Hauraki, off New Zealand, returns to the air.	Links
1968	Pirate Radio Marina, in the Netherlandsd, begins transmissions.	Links
1968	British Pirate Radio Modern (259) begins transmitting.	Links
1968	Pirate Radio Station Pegaus, in New Zealand, begins transmitting.	Links
1968	Radio Prague (Czech) at 12:50 AM announces a soviet led invasion. Warsaw Pact forces enter Czechoslovakia to end reform movement.	Links
1969	Pirate Radio 259 begins operation off the French coast.	Links
1969	Pirate Radio Station 259, serving England and France, begins transmitting.	Links
1969	Pirate Radio Station 295, serving England and France, begins transmitting.	Links
1969	Pirate Radio Station Free Derby begins operation by Northern Ireland.	Links
1969	Tobacco advertising is banned on Canadian radio and TV.	Links
1971	German Clandestine Radio Deutsche Reich begins transmitting on FM.	Links
1971	Radio Bangladesh begins transmitting.	Links
1971	Radio Hanoi broadcasts Jimi Hendrix's 'Star Spangled Banner'.	Links
1971	US National Emergency Center erroneously orders US radio and TV stations to go off the air. The mistake wasn't resolved for 30 minutes.	Links
1973	Pirate Radio Free America off Cape May New jersey, goes on the air.	Links

1975	Early warnings provided by REACT (ham radio operators) means only 3 people die in US tornado that strikes Omaha NE.	Links
1976	Viking 1 radio signal from Mars help prove general theory of relativity.	Links
1980	The 'Mi Amigo' ship containing England's pirate Radio Caroline sinks.	Links
1982	US President Reagan begins 5 minute weekly radio broadcasts.	Links
1983	Radio Moscow announcer Vladimir Danchev praises Afghanistan Muslims standing up to Russia. He is removed from the air.	Links
1983	Shortwave pirate Radio USA, from Wellsville New York, begins transmission.	Links
1984	During a radio voice test Pres Reagan joked he 'signed legislation that would outlaw Russia forever. We begin bombing in 5 minutes'.	Links
1985	Sony builds a radio the size of a credit card.	Links
1985	US began broadcasts to Cuba on Radio Marti.	Links
1986	Pirate Radio Euro Weekend (Holland) begins transmitting.	Links
1988	Bulgaria stops jamming Radio Free Europe after more than 30 years.	Links
1988	Soviets stop jamming Radio Liberty for the first time in 38 years.	Links
1989	Time Inc. announces the purchase of Warner Communications, Inc, forming the world's largest media and entertainment conglomerate.	Links
1990	Pirate Radio New York International begins transmissions on WWCR.	Links
1990	Radio Berlin International's final transmission final song is 'The End' by the Doors. It had links to Deutsche Welles of West Germany.	Links
1990	Radio Kuwait goes off the air, due to the Iraqi invasion.	Links
1992	RFC 1313, Today's Programming for KRFC AM 1313, Internet Talk Radio.	Links
1992	Britain's Radio Authority licenses Virgin and TV-AM radio licenses.	Links
1993	Internet Talk Radio begins broadcasting	Links
1994	**Radio stations start rebroadcasting round the clock on the Internet.**	Links
1995	Radio HK, the first commercial 24 hour, Internet-only, radio station starts broadcasting.	Links
1996	Radio Canada International's final shortwave broadcast.	Links

Note 1: Events described with text like *this* have been entered from one source but have not yet been verified against a subsequent source (Explain).

Note 2: The events are sorted in semi-chronological order according to what is factually known about the date of the event (Explain).

History Mole

Monday
05 January 2004

Radio Broadcasting (1873-)

The transmission of sound via radio waves.

Introduction

When Marconi made the first radio transmissions across the Atlantic in1901, he began a broadcasting tradition that is still with us today. The early AM (amplitude modulated) transmissions have now largely been replaced by higher quality FM (frequency modulated) signals.

Digital transmissions have now begun, using the conventional medium of the air, as well as over such mediums as cable, satellite and the Internet.

Timeline

1873	James Clerk Maxwell states that light is an electromagnetic phenomenon and predicts radio waves.	Links
1883	George Fitzgerald develops the theory of radio transmission.	Links
1887	**Heinrich Hertz discovers transmission, reception and reflection of electromagnetic radio waves.**	Links
1890	In France, Branly's coherer conducts radio waves.	Links
1894	Heinrich Hertz staes that radio waves travel at speed of light and can be refracted and polarised.	Links
12 Dec 1901	**Guglielmo Marconi makes the first transatlantic radio transmission from Cronwall in England to Newfoundland in the USA.**	Links
1902	US Navy installs radio telephones aboard ships.	Links
1904	Physicist Sir John Ambrose Flemming (1849-1945) invents the diode valve and rectifier which improves radio communication.	Links
1904	Marconi Co establishes "CQD" as the first international radio distress signal.	Links
1906	Dunwoody and Pickard build a crystal-and-cat's-whisker radio.	Links
1906	Dr Lee DeForest demonstrates his radio tube.	Links
1906	International Radio Telecommunications Com adopts 'SOS' as new call for help.	Links
1906	Reginald A Fessenden became the first to broadcast music over radio (Mass, USA),	Links
1907	DeForest begins regular radio music broadcasts.	Links
1908	Wireless Radio Broadcasting is patented by Nathan B Stubblefield.	Links
1909	Radio distress signal saves 1700 lives after ships collide.	Links

1909	The first broadcast talk. The subject was women's suffrage.	Links
1909	Einar Dessau of Denmark makes the first radio ham broadcast.	Links
Dec 1912	Douglas Mawson must begin his lone trek across George V Land back to his base at Commonwealth Bay. Mawson's two companions had died and despite the tragedy, he makes it home. A new section of coast is discovered and radio is used for the first time in Antarctica.	Links
1912	The US passes a law to control radio stations.	Links
1912	Feedback and heterodyne systems usher in modern radio.	Links
1914	A better triode vacuum tube improves radio reception.	Links
1914	Radio message is sent to an aeroplane.	Links
1915	Wireless radio service connects USA and Japan.	Links
1915	The first transatlantic radiotelephone message, Arlington, Va to Paris.	Links
1919	Shortwave radio is invented.	Links
1920	The first US commercial radio, 8MK (WWJ), Detroit began daily broadcasting.	Links
1921	Quartz crystals are introduced to keep radio signals from wandering from their pre-set frequency.	Links
1922	BBC begins domestic radio service from 2LO at Marconi House.	Links
1922	Radio Moscow begins transmitting. Its output is 12 KW and the most powerful station of the time.	Links
1923	The first radio telegraph message from Netherlands to Dutch East Indies.	Links
1923	The first transatlantic radio broadcast of a voice, Pittsburgh to Manchester.	Links
1923	The first radio transmission of a US Presidential address is broadcast by President Calvin Coolidge.	Links
1923	US President Harding is the first US President to use radio, dedicating the Francis Scott Key memorial in Baltimore.	Links
1923	First US radio network is established by AT&T.	Links
1924	'The Eveready Hour' is the first sponsored radio program in the US..	Links
1924	By this year there are two and a half million radio sets in the US.	Links
1924	Sokolnicheskaya Radio begins broadcasting from Moscow.	Links
1924	The first US coast-to-coast radio hookup General John Joseph Carty speech in Chicago.	Links
1924	The first photo facsimile transmitted across Atlantic by radio.	Links
1924	The first US political convention broadcast on radio-Republicans at Cleveland.	Links
1925	Commercial picture facsimile radio service is introduced across the US.	Links
1925	US President Coolidge's inauguration is broadcast live on 21 US	Links

radio stations.

1926	Commercial picture facsimile radio service begins across the Atlantic.	Links
1926	The automatic volume control is introduced on radios.	Links
1926	National Broadcasting Co (NBC) is created by the Radio Corporation of America.	Links
1926	The first check sent by radio facsimile transmission across the Atlantic.	Links
1927	NBC begins two radio networks, CBS is formed.	Links
1927	US Radio Act declares public ownership of the airwaves.	Links
1927	'Grand Ole Opry' makes its first radio broadcast, in Nashville, Tennasee.	Links
1927	US President Coolidge creates Federal Radio Commission, the predecessor of the FCC.	Links
1928	Algemeene Vereeniging Radio Omroep (AVRO) begins broadcasting in the Netherlands.	Links
1928	Radio Service Bulletin lists radio stations call signs that are to be changed to conform with international standards.	Links
1928	The first radio telephone connection between Netherlands and the USA.	Links
1929	The car radio is introduced.	Links
1930	The first round-the-world radio broadcast from Schenectady, New York.	Links
1930	The first US radio broadcast from a ship at sea.	Links
1931	New York's Metropolitan Opera broadcasts an entire opera over radio.	Links
1932	Jack Benny debuts on radio.	Links
1932	Radio City Music Hall opens in New York city.	Links
1932	The first US radio broadcast from a moving train by Belle Baker, WABC, from Maryland.	Links
1933	Radio Clube de Mocambique's, first radio transmission.	Links
1934	BY this year, half of the homes in the US have radios.	Links
1934	Mutual Radio Network begins operations.	Links
1934	Netherlands Indies BC Ltd begain radio transmission from Indonesia.	Links
1935	Nielsen's Audimeter is used to track radio audiences.	Links
1935	The first radio tube made of metal announced, Schenectady, New York.	Links
1936	Radio used for first time for a US presidential campaign.	Links
1936	The first parliamentary debate on New Zealand radio.	Links
1937	Governor Wouters innaugrates the radio station on the Dutch Antilles.	Links

1937	Soap Opera "Guiding Light" premieres on NBC radio.	Links
1938	Radio drama 'War of the Worlds' causes national panic in the USA.	Links
1938	Radio quiz show 'Information Please!' debuts on NBC Blue Network.	Links
1939	Radio Australia begins overseas short-wave service.	Links
1939	Radio NY Worldwide, WRUL, begins radio transmisions.	Links
1940	Dutch Queen Wilhelmina speaks on BBC radio.	Links
1940	The first $64 Question, 'Take It or Leave It', on CBS Radio.	Links
1940	**US FCC hears the first transmission of FM radio with a clear, static-free signal.**	Links
1941	Max Blokzijl begins Nazi propaganda on Dutch radio.	Links
1941	Queen Wilhelmina on Radio Orange warns against treason.	Links
1941	The first US commercial FM radio station goes on the air, Nashville Tennasee.	Links
1942	Canadian Broadcasting Corporation authorized for radio service.	Links
1942	Pro-British Clandestine Radio Diego Suarez's final transmission.	Links
1942	Radio Orange calls for March 1 day of prayer in the Dutch Indies.	Links
1942	Radio Orange calls to defy order to wear 'Jewish star'.	Links
1943	the 'Archie' comic strip is first broadcast on radio.	Links
1943	Anti-nazi Clandestine Radio Soldatsender Calais begins transmitting.	Links
1943	Blue Ribbon Town with Groucho Marx is first heard on CBS Radio.	Links
1943	Clandestine Radio Atlantiksender, Germany, begins its first transmissions.	Links
1943	Jimmy Durante and Garry Moore premiere on radio.	Links
1943	Singer Frank Sinatra debuts on radio's 'Your Hit Parade'.	Links
1945	Clandestine Radio 1212, after broadcasting pro-nazi propoganda for months used their influence to trap 350,000 German army group B troops.	Links
1945	Premier Gerbrandy on Radio Orange tells Dutch they are liberated.	Links
1945	*Radio Budapest, Hungary re-enters shortwave broadcasting after WWII*	Links
1945	Radio Orange ends cooperation at Liese-Aktion.	Links
1945	William Joyce (Lord Haw-Haw) British war radio traitor is charged with treason.	Links
1946	Automobile radio telephones connect to the US telephone network.	Links

1948	Facsimile high-speed radio transmission is demonstrated in Washington DC.	Links
1948	Israeli Radio Station Kol Yisrael's first broadcast.	Links
1948	Radio Denmark begins transmitting.	Links
1948	The first radio-controlled airplane flown.	Links
1948	**Transistor as a substitute for Radio tubes announced by Bell Labs.**	Links
1949	Dragnet is first broadcast on radio on KFI in Los Angeles.	Links
1952	Sony offers a miniature transistor radio.	Links
1954	Radio sets in the world now outnumber daily newspapers.	Links
1954	Transistor radios are sold commercially.	Links
1955	The first radio facsimile transmission sent across the continent.	Links
1957	Pope Pius XII encyclical On motion pictures, radio, TV.	Links
1957	Vatican Radio begins broadcasting.	Links
1958	US Cable carries FM radio stations.	Links
1958	Fidel Castro makes a speech on Cuban pirate radio Rebelde.	Links
1958	Greek Clandestine Burasi Bizim Radio, Voice of Truth first transmission. It had a communist alignment.	Links
1959	Farthest man made radio signal heard from Pioneer IV at 400,000 miles.	Links
1960	A US balloon in orbit reflects radio signals to Earth (Echo I).	Links
1961	FCC approves FM stereo broadcasting which accelerates its development.	Links
1962	The Beatles made their broadcasting debut on BBC radio.	Links
1962	Oscar 2, an amateur radio satellite, is launched into Earth orbit.	Links
1964	The first true Pirate Radio station, Radio Caroline (England) came on-air.	Links
1966	Pirate Radio 390 (Radio Invicata) off England, resumes transmitting.	Links
1966	Pirate Radio Scotland changes name to Radio Ireland.	Links
1966	Pirate Radio Station 390 (Radio Invicta) closes down. It reopens on 31 December.	Links
1966	Radio Free Asia (South Korea) begins radio transmission.	Links
1966	Radio RSA, South Africa begins shortwave transmissions.	Links
1967	Britain's Marine Offense Bill making pirate radio stations a crime goes into effect, pirate station Radio 355 closes down.	Links
1967	British pirate radio station Radio 355 goes off the air.	Links

'Hear-and-See Radio' in the World of Tomorrow: RCA and the presentation of television at the World's Fair, 1939-1940.(Radio Corporation of America)

Historical Journal of Film, Radio and Television, Oct, 2001, by Ron Becker

When the 1939 New York World's Fair opened, the Radio Corporation of America (RCA), the National Broadcasting Corporation (NBC) and the newly emerging technology of television were there. NBC officially inaugurated the nation's first regular television service on 30 April with its live coverage of the opening ceremonies direct from the fairgrounds in Flushing Meadows. Panoramic shots of the Fair's symbols, the Trylon and Perisphere, transduced into electronic signals by NBC's recently acquired mobile television units, were sent eight miles via radio waves to the NBC antenna atop the Empire State Building which, in turn, 'sprayed' the images across a 50-mile radius [1]. Viewers watching on the estimated 200 television sets scattered around the New York area could see gathering crowds, the opening parade, and an address by President Frauklin Roosevelt. Meanwhile, fairgoers anxious to avoid a chilly breeze or the jostling spectators could have gone to RCA's World's Fair Building located just yards away from the parade route and observed the same events on one of the nine RCA-built receivers on display in the lobby. Over the subsequent weeks and months, hundreds of thousands of fairgoers would stream through the RCA Building, gaze at carefully designed television exhibits, watch live TV broadcasts, and listen to RCA spokespeople extol the virtues of 'hear-and-see radio' [2] and of the corporation whose research efforts and dollars, it seems, made it all possible.

While most broadcasting histories identify television's debut at the Fair as a noteworthy if oddly-placed milepost in (the initial, if tentative and ill-timed, baby step toward) the development of commercial television, no account fully explains how television was presented to the public in specific exhibits nor adequately situates TV's debut within the wider contexts of industry competition, government regulation, or the World's Fair itself. [3] This article describes the incorporation of television into various exhibits around the Fair, paying particular attention to the efforts of RCA.

The New York World's Fair of 1939 offered the Radio Corporation of America an invaluable opportunity to announce the long-awaited arrival of television and, in doing so, establish itself as the preeminent force in building television's future. The World's Fair promoted a vision of a not-so-distant future in which new technology, provided by industry and guided by social ideals, would lead to a better society where consumerism and democracy triumphed. [4] Companies like RCA, anxious to promote both themselves and their consumer products, wrapped their exhibits in public relations rhetoric which worked hard to convince visitors that corporations were not simply profit-hungry businesses that sold consumer goods, but rather vital components of a democratic society that provided the tools needed to build a better tomorrow. Such lofty rhetoric, as we will see, served RCA and NBC particularly well in the late 1930s--a period during which they faced FCC investigations into monopolistic practices, competed with others in the television standards battles, and waited impatiently for an FCC green light on the commercialization of television broadcasting.

Building the 'World of Tomorrow' Today

At the New York World's Fair of 1939, the objectives of its planners and its corporate participants dovetailed considerably. The Fair's organizers, particularly those involved in developing the event's overarching theme,

believed that the Fair could be a powerful force of social change. Grover Whalen, the Fair's president, announced that the Fair was 'determined to exert a social force and to launch a needed message' [5]. In the eyes of its planners, the Fair was to offer an antidote to the anxieties caused by the Great Depression and by the rise of fascist and communist threats to democratic principles [6]. More specifically, the Fair, with its theme 'Building the World of Tomorrow,' presented a vision of what its planners believed to be an attainable future in which technological advances, consumerism, and social planning would lead to a 'promised land of material abundance' [7].

Attuned to the principles of the corporate system, the Fair's organizers stressed what the Official Guide Book called 'the interdependence of man on man' [8]. In modern industrialized societies with national economies, large-scale industries and mass-produced goods, people were (Fair's organizers explained) living within an increasingly extensive network of dependent relationships. A focal exhibit for the Production and Distribution Zone, for example, graphically illustrated how the action of a woman powdering her nose initiated a complex web of activities involving 'great and small industries and an army of workers in mine, factory, warehouse, office and store, and on railroads, steamships, trucks, and delivery wagons' [9]. Similarly, the Communications Building's focal exhibit that presented 'the story of man's progress in communications from the sign language of the earliest ages to the modem marvel of television' stressed the 'socializing and humanizing force' of communication networks and their role in l inking 'man to man'. According to an inscription on one wall of the exhibit hall, 'Modern means of communication span continents, bridge oceans, annihilate time and space ... They offer all men the wisdom of the ages to free them from tyrannies and establish co-operation among the peoples of the Earth' [10]. The emergence of such interdependence and the technological advancements that propelled it, these exhibits claimed, were responsible for the average American's improved standard of living, and the expansion of such networks would produce ever increasing levels of peace, prosperity and leisure in the not-so-distant future.

The importance of the consumer in the production and distribution focal exhibit was also symptomatic of the Fair and of its planner's objectives. Organizers claimed that, unlike earlier international expositions which had celebrated the marvels of industry and the means of production, the New York World's Fair was to be a 'consumer's fair.' The consumer and the promotion of consumption played key roles in plans for 'Building the World of Tomorrow', especially in overcoming the economic problems of the Depression and the rise of communism and fascism in Europe. By the end of the 1930s, many realized that mass production demanded mass consumption [11]. According to the Fair, however, there was no need for systemic social, political or economic changes. Instead, technological innovations, transformed into useful consumer products and implemented by social planners, would create the broad distribution of wealth and a culture of abundance in which everyone would have ample purchasing power and leisure time to cons ume [12]. Fair organizers, thus, encouraged the design of exhibits that addressed visitors as consumers and that engaged their interests by explaining the processes behind production practices and by illustrating the practical applications of scientific innovations [13]. Consequendy, focal exhibits and many corporate displays de-emphasized the scientific principles behind new technologies in order to illustrate how science was being transformed into products which would improve the visitor's life and lead to a better society [14].

Although its theme looked forward to a utopian world of tomorrow, the Fair told visitors that they could and should start building that world today. The Official Guide Book, for example, advised its readers: 'Here are the materials, ideas, and forces at work in our world. Here are the best tools that are available to you; they are the tools with which you and your fellow men can build the World of Tomorrow' [15]. Democracity, a detailed diorama and light show featuring an imagined 'City of Tomorrow', served as the ultimate expression of the Fair's official message. Visitors gazed down upon the skyscrapers, satellite towns, broad highways, and open countryside that supposedly would define the American landscape of the future. As the show neared its end, the lights dimmed, night fell on Democracity, and a chorus sang the Fair's theme song: 'We're the rising tide coming from far and wide/Marching side by side on our way,/For a brave new world,/Tomorrow's

world,/That we shall build today' [16]. At the show's clim ax, a burst light flashed, the music stopped, and visitors found themselves at the dawn of a new day. Leaving the exhibit with the words of the chorus still ringing in the ears and the image of a new day's light shining in their eyes, fairgoers descended a long curving ramp from which they had a perfect view of the fairgrounds. Here, in the Fair's focal exhibits and corporate-sponsored buildings, Fair organizers claimed, awaited 'the best of the tools available ... today' to build that tomorrow [17].

The vision of the future advocated by the Fair's official theme, then, was clearly corporate-friendly. While the focal exhibits themselves did privilege the role of the social planner, fair organizers were anxious to involve corporations in their plans for building the future. Although many on the Fair's various steering committees were urban planners, architects, social critics, and industrial designers, the Fair's founders were businessmen who developed the Fair as a way to draw business to Depression-weary New York and as a business venture in and of itself They realized from the beginning that the enthusiastic participation and investment of corporations would be essential to the development of a profitable world's fair and worked hard to attract their involvement. In a bulletin sent to prospective exhibitors, for example, Grover Whalen emphasized the important role corporate participants would play in New York's 'consumer's fair':

We of the Fair Corporation believe that business and industry possess today most of the implements and materials necessary to fabricate a new World of Tomorrow. We believe that what are needed at present are not so much new inventions and new products as new and improved ways of utilizing existing inventions and existing products [18].

Whalen tried to impress companies with the unprecedented promotional possibilities of the Fair, claiming that it offered business and industry 'a great opportunity--an opportunity to construct their own World of Tomorrow' [19]. Participation in the Fair was sold not as simply an expenditure but rather an investment that would surely pay off in the long run [20].

The Fair's public relations opportunities were particularly appealing to many companies at the end of the 1930s. Faced with New Deal legislation, increased labor tensions, and a public dissatisfied with the role of big business in the Depression's economic crisis, corporations paid more and more attention to conducting solid public relations [21]. Articles in business magazines like Fortune advised companies that it was no longer enough to offer customers products at a decent price; a business also needed to convince the consumer that it was also 'fulfilling what he regards as its social obligation' [22]. Thus, companies initiated industrial advertising campaigns that tried to demonstrate to the public how the efforts of big business actually 'contributed to the advancement of the American standard of living' [23]. General Electric's national campaign at the time with its slogan, 'More goods for more people at less cost', for example, stressed the contribution its corporate-backed research efforts and consume r products made to the social good.

The public relation campaigns of many companies dovetailed nicely with the lofty rhetoric of the Fair's 'World of Tomorrow' theme. The Fair-of-the-Future committee faced little resistance in suggesting that 'Both the Fair and Industry [would] be best served if industry adopt[ed] the strategy of emphasizing its place as a servant of man and demonstrate [d] that it serves itself best by serving civilization' [24]. Corporations like GM, Du Pont, Heinz, and GE spent millions of dollars designing exhibition buildings that avoided a hard-sell approach by draping their corporate identities and products in the mantel of social responsibility that came along with 'Building the World of Tomorrow'. Visitors, for example, could see Bordens' 'Dairy World of Tomorrow', in which milk production and husbandry were automated and sanitized through conveyor belts and mechanical milking machines [25]. Ford's 'Road of Tomorrow' displayed elevated highways that promised to make travel faster and safer [26]. A General Electric ad f or its exhibit succinctly expressed the way corporate exhibitors used the Fair's ideological message to link their products and themselves to a better 'World of Tomorrow':

We invite you to see these and other features of the G-E exhibits ... not only because they are entertaining and spectacular, but because they reveal the secret of America's progress. They show how American industry, by developing new products, improving them, and learning to make them inexpensive, has made it possible for millions of people to have more of the good things of life [27].

Similarly, an ad by Sealtest for its World's Fair exhibit addressed the connection between attaining a better tomorrow with the technological tools of today as it informed the reader, 'You will see how Sealtest builds to a healthier, happier tomorrow by making life safer, today' [28]. Such ads and exhibits led Fortune magazine to dub the Fair 'that great free-for-all of industrial public relations' [29].

More than any other building, General Motors' Futurama best exemplified corporate exhibitors' attempts to capitalize on the Fair's social message for public relations gain. By far the Fair's most popular and expensive attraction, GM's Futurama, with what was, at the time, the largest diorama ever built, transported fairgoers to the future and presented them with a 16-minute bird's eye view of 1960 America as envisioned by GM's industrial designer. Visitors, seated on moving chairs, experienced the sensation of traveling hundreds of miles across the landscape. Below, they saw animated towns, cities, rivers, fields, and forests. GM's narrator drew the visitors' attention to the superhighways, speed lanes, multi-decked bridges and to the 50,000 scale-model automobiles which not only crisscrossed the countryside but also demonstrated how 'by multiplying the usefulness of the motor car, the industry's contributions toward prosperity and a better standard of living for all [would be] tremendously enhanced' [30]. Th is world laid out before them, the narrator informed the spectators, would come not only as the result of 'new concepts in science and research', but also by 'a new understanding of the true function of industry as an integral part of the nation's social and economic life' [31]. At the end of the ride, as the moving chairs descended for a close-up view of GM's idea of a typical 1960 street intersection, the narrator announced: 'In a moment we will arrive on this very street intersection--to become part of this selfsame scene in the World of Tomorrow--in the wonder world of 1960--1939 is twenty years ago! All eyes to the future!' [32]. Upon exiting the exhibit, fairgoers found themselves within a full-scale reproduction of that street corner of the future, complete with elevated sidewalks, pedestrian bridges, and 1939-model GM cars and trucks.

Typical of the public relations soft sell that dominated Fair exhibits, Futurama did not so much sell GM products as as promote a vision of a prosperous tomorrow shaped by networks of high-speed super highways which just happened to make GM cars seemingly indispensable [33]. The smog-free, slum-free order of Futurama's world presented an appealing, if idealized, alternative to Depression-era cities. By providing the materials and imagination that could help forge that future, GM tried to sell itself as a civic-minded corporation apparently more interested in promoting the social good than in generating profits. GM's vision of the future, of course, didn't depend solely on its own products, but also on the construction of a federally-funded interstate highway system--a project that would be paid for with the tax dollars of those same fairgoers flying over GM's diorama. By linking its specific corporate goals with the Fair's utopian rhetoric, GM worked hard to mobilize general support for itself, its vision of the future, and its products and thus exemplified industrial public relations at the Fair.

Television and RCA Go to the Fair

By 1937, communications giant RCA had decided to participate in the World's Fair and on 21 June 1938, began construction of the 60,000 square foot RCA Building. Designed to resemble a giant radio tube, the building housed exhibits from a variety of RCA's companies, including RCA Manufacturing, RCA Communications, Radiomarine Corporation and the National Broadcasting Company [34].

Sarnoff appointed NBC President Lenox Lohr to oversee the corporation's presence at the Fair, capitalizing on

Lohr's experience as an organizer of Chicago's Century of Progress Exposition. In tune with the perspective of many corporate exhibitors and the Fair's organizers, Lohr informed RCA's World's Fair Committee that it couldn't successfully develop a hard-sell approach at the Fair but rather should focus on executing an 'industrial sales job' [35]. Consequently, RCA's exhibits weren't intended to push specific products per se but to build good will and name recognition among the corporation's various constituencies. In a lengthy memo to Sarnoff, Lohr explained that RCA's exhibits were designed

[a] to present to the ultimate consumer, in the most entertaining visual manner, company products, aims, and purposes;

[b] to consolidate dealer, distributor, and sales organizations;

[c] to personalize their industries to consumers, stockholders, and their own employees;

[d] to propagandize subtly their problems with the government [36].

RCA's goal, then, was to present the public, widely defined, with 'all of the products and services of the RCA companies' [37].

In line with the Fair organizers' emphasis on addressing average consumers not specialized experts, RCA filled its building with exhibits that would not only capture visitors' attention amid the din of the crowded fairgrounds but also demonstrate the practical and beneficial uses of RCA research and products to the average citizen. As Lohr put it, RCA developed exhibits 'with the accent on showmanship' [38]. Exhibits proposed in the earliest planning stages, for example, included microwave circuits and transmitters that would allow visitors to talk to each other across the room, a magic singing fountain operated by a beam of light that could play the NBC chimes, and a miniature high-voltage smoke dispeller [39].

A number of exhibits featured radio technology, RCA's primary product, in a broad range of applications that were intended to highlight RCA's contributions to advancing the social good. In the garden just outside the building, for example, visitors could tour a floating yacht designed to demonstrate marine radio technology, while inside, an animated diorama featured RCA-built radio technology as the indispensable tool that helps save the lives of those aboard a sinking ship. Other exhibits illustrated how radio technology worked to link people around the globe by making air travel safe and providing the most effective means of communication.

The centerpiece of RCA's exhibit, however, was television. From the earliest planning stages to the opening day ceremony, RCA's presence at the World's Fair was carefully staged to serve as television's debut for NBC's regular service, the Feberal Communications Commision (FCC) and the public [40]. Since 1935, RCA had been looking to move television technology 'out of the laboratory and into the field' [41]. In subsequent years it expanded its attempt to refine transmission and reception quality in the laboratory, intensified experimental broadcasts from the NBC tower atop the Empire State Building, and started remote shooting experiments with its telemobile unit. By 1939, RCA, having spent nearly $10 million on television, was anxious to start earning a return on its investment, and the Fair seemed to promise a wealth of opportunities. RCA tried to exploit its presence at the World's Fair in order to advance its public image, gain valuable experience in television broadcasting, and obtain an advantageous pos ition vis-a-vis both its competitors and the FCC.

Like many corporations in the 1930s, RCA felt the heat of government regulation and a suspicion of big business. In 1938, amid the antitrust push of the second New Deal, the FCC initiated an investigation into possible monopolistic practices in network radio--an investigation that would continue until 1941. The chain

broadcasting investigations clearly threatened NBC, who, with two national radio networks, had as much to lose by stricter government regulations as any one in the industry. At the same time RCA finalized plans for its exhibit at the Fair, David Sarnoff, RCA President and Chairman of NBC, appeared before the FCC to explain its network practices. In defending NBC's position in the industry, Sarnoff referred to RCA's pioneering work in television. RCA had spent millions of dollars advancing television to a usable state, Sarnoff argued, yet was ready to share its technology with others in the industry. Only a large-scale corporation like RCA, Sarnoff claimed, could marshal the resources need to deve lop such costly, yet socially beneficial, services [42]. RCA's presentation of television at the Fair worked to reinforce such claims, and internal memos suggest that those involved in designing the exhibits believed RCA's World's Fair presence could influence government perceptions of the corporation and hopefully its regulatory decisions [43].

At the time, RCA also faced challenges more directly related to television. Throughout the 1930s, a number of companies had rushed to develop the technology that would become the standard for television service in the United States. By 1939, anxious to move ahead with commercial television, a number of key players in the race, led by RCA, formed the Radio Manufacturers Association. Settling upon certain technical standards for television transmission, the RMA urged the FCC to approve them and open the door for commercial service [44]. The FCC, however, believed it was too early to set standards or to commence commercial broadcasting, fearing such moves would retard any future refinement in the technical quality of television or might lead consumers to purchase receivers which could quickly become obsolete if technical advances were made. Although the FCC refused to give the official go-ahead for commercial television, a number of companies began marketing sets in the hope of gaining the advantage for when the green light was finally given. Thus, RCA found itself jostling with a number of competitors, including Philco, General Electric, Westinghouse, and Du Mont for leadership in the newly emerging television industry.

RCA's objectives for television's advancement were also threatened by the emergence of FM radio. Although instrumental in Edwin Armstrong's early development of frequency modulation technology, RCA abandoned Armstrong's invention in 1935, allegedly because Sarnoff considered it a threat to television. Armstrong, however, struck out on his own and by the late 1930s was asking the FCC for valuable frequency allocations for FM stations. At the same time, RCA and others working in television were anxiously applying for the same limited spectrum space, escalating to a full-scale battle between the two newly emerging communications systems.

Amid such struggles, RCA demonstrated the marvel of television for fairgoers and inaugurated the nation's first regular broadcast service at the opening of the World's Fair. On 21 October 1938, David Sarnoff, in an address to the Radio Manufactures' Association, had declared that NBC would commence regular broadcasting on 30 April 1939, in conjunction with the opening of the exposition and that RCA would simultaneously begin marketing sets for home use [45]. By the time the Fair opened, Sarnoff promised, NBC would be providing at least 2 hours of programming per week. According to Sarnoff, RCA was 'convinced that experimental research [had] reached a point where a practical image receiver [could] be offered to the public without fears of it soon becoming obsolete' [46]. RCA's efforts at the Fair clearly were a bid not only to stimulate public interest in its products and advance its corporate image, but also to encourage or even force FCC action to approve commercial television.

RCA's presence at the Fair also gave the company a significant advantage over its competitors. Although RCA's sets were joined on store shelves by several other brands, the only companies besides RCA able to promote their work in television at the Fair were Westinghouse and GE. Smaller firms like Philco and DuMont were nowhere to be found amid the elaborate and costly corporate buildings dominating the fairgrounds [47]. This advantage afforded RCA a valuable public relations opportunity--one they were keenly aware of. Lenox Lohr, NBC president and head of RCA's World's Fair Committee, for example, told Samoff that RCA's exhibit offered them the perfect chance to

educate important leaders from all parts of the country and from all walks of life to think of television as an RCA-NBC product and to cement in their minds the thought that we are the pioneers in this new field of endeavor. In other words, to make television practically a trade name for RCA-NBC [48].

RCA, then, worked hard to capitalize upon its participation in the Fair, carefully planning the exhibit and exploiting every possible angle to get the most out of television's 1939 debut. Along side GM's superhighways, Borden's electrified dairy farms, and Du Pont's high-tech plastics, the new tecbnology of 'hear-and-see radio' was brought to the public (courtesy of RCA) as an integral part of the World of Tomorrow'.

Plans for how to best present television to the public were carefully developed and revised. The earliest designs included a set up in which visitors would be recorded by a television camera and could then watch their images instantly transmitted to nearby receivers [49]. Initial plans also included the installation of television sets in small viewing rooms 'so as to demonstrate, as nearly as possible under World's fair conditions, the normal situations of television in the home' [50]. Aware that General Electric and Westinghouse would also be incorporating television into their exhibits, the RCA Fair Committee concluded that 'it was essential that [RCA's] receivers be of the best and latest type' and ordered RCA's manufacturing division to start making receivers with 15 to 18 inch tubes. Committee members also stressed that at least one projection tube be included in the exhibit [51].

The constraints of early television technology, however, led to two major problems. First, a key objective for the demonstration was to expose as many fairgoers as possible to the new technology. Both the size of the television screens and of the small, living-room-like viewing rooms, however, greatly limited the number of people who could see each demonstration. Designers initially decided to simply increase the number of demonstrations per hour. In December 1938, however, the RCA Fair Committee decided 'to expand the television exhibit to meet possible competition in view of the present activities' [52]. As General Electric and Westinghouse increased the role of television in their exhibits, RCA felt it vital to maintain their preeminence in the demonstration of television. Consequently, they rearranged the interior of the building and turned the small viewing rooms into one large hall. Once the Fair opened more than 50,000 fairgoers a week could watch a 10-minute TV show on 12 9X12 inch receivers. Visitors to the RCA building could also see the technical story of television's development in various displays such as a television laboratory, a camera set-up with a model transmitter, a laboratory type television receiver, and a glass-encased receiver that revealed the inner workings of the new technology [53]. In a manner typical of exhibits at the consumer's fair, RCA also made sure to demonstrate what it envisioned television's practical uses to be. In place of the small viewing rooms, RCA presented visitors with a full-scale model radio living room of today side by side with a radio living room of tomorrow designed to illustrate the most efficient use of television in the home [54].

RCA's second problem involved the programming needed to demonstrate its receivers. In the preliminary plans, RCA hoped to rely primarily on programming from its Radio City studio (sent to an on-site tower located just outside the RCA Building via the antenna atop the Empire State Building). Engineers, however, couldn't predict the effect local noise from devices in nearby exhibits might have on television signals. Consequently, they constructed a small building on an isolated corner of the RCA lot at the Fair to house a 16 mm film projector and a small, local transmitter that would feed receivers in the exhibit with filmed programming. While they hoped that this arrangement would provide a clear signal over the air, even under the worst conditions, they also laid a cable connection to guarantee a clear signal [55]. The film was planned to run about 10 minutes and be comprised of newsreel footage edited semi-weekly and introduced with a 'leader' that welcomed the visitor to the RCA exhibit. Again, in line with the consumer-fair approach that aimed to entertain while promoting specific uses for TV in the 'World of Tomorrow', Lohr claimed that this strategy would have the advantage of 'simulating the program service which promises to have the greatest

appeal-that of showing the drama of current events'. Further, by editing the newsreels to only the best topics presented in 10 minutes, the number of demonstrations per hour could be maximized [56].

When the Fair opened, RCA broadcast programming to its demonstration sets every day between 11 am and 9 pm, relying on three programming sources. Of the 311 hours broadcast in the Fair's first month, 114 hours consisted of the filmed newsreels transmitted from the outbuilding. Another 136 hours originated from the Radio City studios and the remaining 61 hours came from NBC's roving telemobile units which provided live programming by conducting on-the-street interviews with fairgoers, covering special events at the Fair, and touring other exhibits [57]. When they weren't scouring the grounds, the telemobile units were to be parked in front of the RCA's Building, making it easy to send the electronic feed via cable and hopefully drawing a crowd of curious onlookers-'an important item in the competition for interest at the world's fair' [58].

RCA's exhibit was far from the only one to include 'hear-and-see radio'. Television, of course, was prominently featured in the Communications focal exhibit. Meanwhile, visitors to the Hall of Pharmacy's futuristic Drug Store of Tomorrow display could see a television-telephone booth alongside a streamlined 'Soda Fountain of the Future' [59]. At the General Electric Building, visitors got a first-hand view of television production work. Just off the main lobby, GE built a television studio where, as crowds looked on through glass walls, one fairgoer, plucked out of the audience, was interviewed in front of the cameras. The interview was immediately transmitted across the lobby to a row of monitors on the opposite wall as friends and onlookers rushed to see their companion's image live on TV. The Westinghouse Building followed a similar formula. Such demonstrations by GE and Westinghouse, as well as RCA's man-on-the-street remote interviews, resembled many other exhibits at the Fair which worked hard to incorp orate the crowd as an integral part of the exhibit [60]. AT&T, for example, randomly selected visitors who could use display telephones to make free long-distance calls anywhere in the country; meanwhile, hundreds of fairgoers eavesdropped on the conversations. Consistent with the consumer's-fair approach, the technology of television wasn't the only thing on display; the public's use and enjoyment of it were featured as well. Such design strategies clearly had advantages to companies trying to promote their products not just as technological marvels but also as appealing consumer goods. At the same time, the demonstrations offered viewers glimpses of television's interactive capabilities-qualities which, years later under network control, would rarely, if ever, be experienced by consumers.

As far as RCA was concerned, however, television wasn't simply on display at the Fair; it also covered it, and its various telecasts from the fairgrounds provided valuable experience for its engineers and publicity for the company. On 17 November NBC, in the first experimental broadcast from the Fair, covered a celebration for the arrival of 1,000,000 tulips from The Netherlands [61]. On 27 February the fairgrounds served as the site of the first experimental broadcast of a commercial radio program as NBC cameras transmitted the images of Amos n' Andy stars Freeman Gosden and Charles Correll [62]. The final broadcast before the official opening of the World's Fair took place on 20 April at the dedication ceremony for the RCA World's Fair Building. After a few introductory remarks by an announcer at the Radio City studio, the program cut to the fairgrounds. As the radio 'eye' scanned down the Avenue of Patriots, viewers watching at Radio City and those few perhaps watching at home saw scores of workers lining the streets eating lunch with the Fair's landmarks-the Trylon and Perisphere- in the background. The program cut to the RCA garden where Lohr, - Sarnoff and others addressed a crowd of 100 guests [631. At the conclusion of the program, NBC returned to the Radio City studio and coverage of a boxing match. Such experiments also served as valuable publicity stunts, and the press took great interest in them. Stories in The New York Times, for example, nearly always included a photograph of the image just as it appeared on television screens and often reminded readers that NBC would be starting regular television service in conjunction with the opening of the Fair.

On 30 April television finally made its official debut with its 3-hour coverage of the opening ceremonies for the Fair [64]. At 12:30pm an estimated 1000 people were watching as far as 50 miles away on the 100 or so

sets in New York area homes, eight miles away at RCA's Radio City facilities, and just a few hundred yards away on the 12 television receivers set up in the RCA Building. The 'electronic eye' of the NBC television cameras opened the program with a shot of the Trylon and Perisphere. Sweeping across the Court of Peace, the cameras provided a panoramic view of the gathering crowd, flags, fountains, and, eventually, the parade and ceremonies. NBC covered the event with one camera situated some distance from the central platform and grandstand where most of the ceremony took place. The procession ended with the arrival of a number of dignitaries including New York Major La Guardia, Grover Whalen, and President Roosevelt. After a number of speeches and ceremonial events, the telecast was over [65].

Bruce Crotty, the producer in charge of the mobile units, saw the event as yet another learning experience in the young art of television broadcasting. Viewers complained that the camera was too far away from the podium, making the images much too small; few of the notable guests, for example, could be identified. When LaGuardia walked directly up to the camera as the procession of dignitaries walked by, however, viewers watching at Radio City had no problem identifying him, and NBC engineers would later rate him 'the most telegenic man in New York' [66]. The small television audience also complained about the static camera and long takes, indicative of the fact that NBC used only one camera to cover the event. Engineers realized they would need to use a number of cameras to provide the varied angles and close-ups required to create exciting coverage [67]. Finally, some mention was made of white streaks marring the image which were attributed to the instability of the metal platform on which the camera rested . At future events, NBC engineers learned, the traditional facilities used by film newsreel crews would be insufficient and special platforms and locations would need to be provided for television coverage [68]. In the end, however, Crotty believed that the program, though far from perfect, was very successful, especially since it had been the first attempt at covering such a huge outdoor event in America [69].

NBC's programming staff continued to capitalize on the Fair well after the opening ceremonies ended. Having just inaugurated regular broadcast service, NBC suddenly needed entertaining material to fill its scheduled hours, and the Fair's many carefully designed and visually exciting exhibits seemed to offer excellent material for television shows. Consequently, NBC crews scoured the fairgrounds with the mobile units. Yet many of the exhibits, especially those designed by business and industry, also offered valuable programming and marketing lessons for NBC's young television department. Preparing for the advent of commercial broadcasting, NBC realized that effectively selling sponsors' products on a visual medium like television would require different tactics than had been developed for radio. At the same time, NBC was surrounded by dozens of corporate exhibits all carefully designed to skillfully promote products and services through visually and aurally entertaining displays like dioramas, murals, and stag ed skits. Lenox Lohr urged NBC's television programming staff to seek out and learn from 'exhibits which [were] presented with subtle merchandising and strong visual entertainment value'. Lohr referred specifically to Westinghouse's 'The Battle of the Centuries'--a humorous theatrical show designed to promote the company's latest dishwashers [70]. Visitors watched as two housewives faced the chore of post-dinner clean-up in a skit that seemed to presage both the domestic sitcom of the 1950s and the commercials that sponsored them. In one kitchen, a harried woman, up to her neck in suds, frantically tried to wash an seemingly endless pile of dirty plates, dishes, and glasses. Meanwhile, the woman in the other kitchen leisurely read a stack of magazines while her Westinghouse dishwasher did all the work [71].

While NBC's television department explored ways of advancing TV programming [72], RCA worked hard to exploit the public relations possibilities of the Fair by wrapping itself and its new product in the lofty rhetoric of the Fair's theme. Like so many other goods and services on display, television wasn't simply just an abstract scientific technology developed in laboratories nor just another consumer product. Instead, it was an essential tool in the construction of the World of Tomorrow'. While GM invited people to see a world filled with superhighways and automobiles, RCA presented fairgoers with its own glimpse into the future--one in which everyone's living room was outfitted with an RCA-made TV set. Sarnoff's televised speech at the RCA

Building's dedication ceremony vividly illustrates how RCA used the Fair's utopian rhetoric and growing fears of war in Europe to promote its corporate image (amid FCC hearings and Depression-era anxieties) and its product (on the eve of its public debut):

It is with a feeling of humbleness that I come to this moment of announcing the birth in this country of a new art so important in its implications that it is bound to affect all of society. It is an art that shines like a torch in a troubled world. It is a creative force which we must learn to utilize for the benefit of all mankind. This miracle of engineering skill which one day will bring the world to the home also brings a new American industry to serve man's material welfare. Television will become an important factor in American economic life [73]:

Echoing Sarnoff, RCA's film, The Birth of an Industry, introduced television to fairgoers as 'a new service whose purpose is constructive in a world where destruction is rampant' [74]. In a world defined by the interdependence of man on man, television, it seems, would be indispensable.

Central to the Fair's message, however, was the conviction that the tools needed to build the utopian future were available today, and RCA's presentation of television worked as well as any exhibit to bridge the gap between today and tomorrow and to exploit the exciting idea that the future was already here [75]. Although visitors to RCA's 'Living Room of Tomorrow' saw their homes reconfigured to include a working television receiver, those very same fairgoers could drive downtown and purchase their own TV set from Bloomingdale's or Macy's. Throughout the summer of 1939, as RCA worked hard to exploit the public's attention on the Fair, the difference between fairgoers watching forward-looking demonstrations at RCA's World's Fair Building and customers listing to sales pitches at Manhattan department store showrooms were as blurred as the line between today and tomorrow. As consumers, visitors to the RCA exhibit could turn tomorrow into today in a way that those seeing GM' Futurama or Democracity couldn't [76] .

Despite RCA's efforts, television's tomorrow wouldn't arrive until the end of the 1940s. In retrospect, RCA's bid to propel television out of the laboratory and into America's living rooms appears ill-timed. The entry of the United States into World War II turned both the government's and much of the industry's attention to the war effort. At the same time, William Paley and CBS challenged the acceptance of RCA's black-and-white system as the standard for commercial television, leading to more debate and more delays in FCC approval of commercial television. While such forces helped thwart RCA's larger goal for the development of television, we are left wondering whether its presence at the Fair achieved RCA's more focused goals: stimulating public demand for television and immediately influencing FCC opinion.

Sources offer conflicting reports about people's reactions to television's debut at the Fair. One news report claimed that the various television displays were so popular that they caused pedestrian traffic problems, and GE claimed that many visitors, so impressed with the demonstrations, wanted to know where they could buy their own sets and how much they cost [77]. Such reports support a 1940 survey of public reaction to television conducted by the World's Fair which indicated that 'the cross-section of visitors interviewed were 100 per cent "in favor" of television as a new form of entertainment' [78]. Conducted by Barry Gordon, a former newspaper correspondent, the questionnaire was given to a select sample of visitors to television exhibits in both 1939 and 1940 [79]. In 1939, visitors were queried 'on whether they "favored" television, their ratings of images, whether they believed home television is practical and when they expected to purchase sets'. The second survey also asked visitors whether they t hought television had improved, when they would most like watching TV, how much they would pay for a set, and what types of entertainment they would most like to see televised. The survey's results, however, are suspect since the questionnaire was clearly set up to elicit positive answers. Although a bolded question 'What do YOU think of TELEVISION?' serves as a headline for the 1940 survey, a following explanatory paragraph informs the subject that 'last year's survey revealed that the cross section of visitors interviewed were 100 per cent "in favor" of television'

and went onto to declare that since then, 'the picture quality of images has improved in brilliance and clarity'. Despite such a pro-television set up, a close examination of the results suggest ambivalent feelings towards the new medium which the analysts summary conclusion of 100% approval ignores.

Other evidence suggests even more strongly that television failed to make as big a splash as RCA and others had hoped it would. While a great number visitors may have crowded around RCA's and GE's television sets, neither exhibit was close to being the most popular destination for fairgoers. General Motors' Futurama was the most widely attended and highly rated attraction, followed by the Democracity, American Telephone & Telegraph, Ford Motor Company, the Soviet Pavilion, the British Pavilion, and the Railroad exhibit [80]. One can only speculate that television's small black-and-white images paled next to the colorful, 3-D drama of interactive dioramas like those at GM and the Theme Center or to the dramatic scientific stunts like GE's man-made-thunder machine. The idea of the Fair was to inundate the visitor's sense at every turn with spectacle. Television, despite RCA's best efforts, may have seemed unspectacular to many viewers. And despite the survey's glowing report about television's 100% approval rat ing, TV sales during the Fair's opening season were dramatically lower than expected. Between 1 May and 1 October, for example, RCA sold only 81 sets-not surprising since a 1939 Gallup poll reported that only 13% of those surveyed were interested in buying a set [81].

The public's apprehension about television may also have been influenced by press coverage of the new technology. Although many articles did herald television's debut at the Fair as significant, most were hesitant about predicting television's success. 'Six weeks to go and up goes the curtain on television for a test to prove whether it is "to be or not to be" a national pastime or a new industry and a theater in countless homes', The New York Times reported. 'The opening of the New York World's Fair on April 30 is booked as Act 1, Scene 1 on a performance that may run on forever' [82]. Several articles used the approaching curtain call of the Fair as a hook to seriously explore exactly what was going on behind all the television talk. Most did contain some of the anticipatory rhetoric that Sarnoff and RCA undoubtedly had hoped to generate. Of television's presence at the Fair, for example, declared, 'This means the decade's most revolutionary invention is at last ready to emerge from the laboratory and make its commercial debut in America' [83]. As in this quote, however, most laudatory comments were usually joined by a good deal of skepticism. Several articles expressed a great impatience that commercial television was taking so long in coming. Further, many weren't so willing to accept RCA's announcement that television had arrived. Articles in both the business and popular press critically examined the technical and economic state of the television industry. Far from treating it as a mysterious invention that would suddenly enrich their lives, these articles informed their readers about the complex challenges-economic, technological, and legislative-that still confronted the industry. Several articles, for example, addressed the limited broadcast range of straight-line television transmission; the cost of coaxial cable; the voracious appetite of the medium for programming; the vicious circle facing a sponsorship-driven medium during its infancy (no audience to attract advertisers, no money to create programs to attract audiences); the continuing debate over standards and FCC regulation; and the trials of television production. Finally, many articles predicted a future for television rather different from RCA's world of tomorrow-a future that included theater television, coast-to-coast relay towers every 50 miles, and acting troupes that would tour the nation, going from station to station to perform [84].

What impact RCA's efforts at the Fair had on the FCC is even more difficult to gage. It seems clear that RCA's public relations campaigned failed to influence the FCC's chain broadcasting investigations. In 1941, the FCC found network practices to be monopolistic and ordered NBC to sell one of its two networks. On the other hand, television's public debut at the Fair may have influenced, at least in part, some changes in the FCC's position on commercialization. By the fall of 1939, the FCC began to take tentative steps toward commercialization, announcing that by September 1940 it would license some television stations to operate on a semi-commercial basis. These so-called Class II station licenses would allow broadcasters to receive payment from sponsors equal to but not greater than programming production costs. Although broadcasters

like NBC wouldn't be able to make a profit, it was clearly the first step towards commercialization. Although uncertain, one can speculate that the efforts of RCA and others to get television in front of the public at the World's Fair accelerated the FCC's timeline. Consistent with its aggressive strategy with the World's Fair, RCA saw the FCC's cautious go-ahead as an opening to forge ahead with commercialization, and in February 1940, it dramatically reduced the prices of its receivers. The FCC believed RCA was again trying to freeze standards and retard research efforts by flooding the market with sets and quickly canceled plans for the allocation of Class II licenses. With the emergence of the war and CBS' bid for color television, the FCC would not assign commercial stations until the mid-1990s, and most Americans would not experience RCA's living room of tomorrow until the mid-1950s.

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NOTES

(1.) Dedication of RCA seen on television, New York Times, 21 April 1939, P. 16.

(2.) New York Fair to start television drive in earnest, Newsweek, 20 March 1939; p. 36.

(3.) While there are few histories of broadcasting that fail to include TV's debut at the World's Fair, most devote only a few sentences or, at most, a paragraph to the event. In general, historical accounts have simply concluded that television's debut in 1939 was either a premature attempt to instigate a television boom or a sneak preview of what was to come. Either way, media histories have considered the event noteworthy but ultimately less interesting than the technological experimentation that proceeded it or the commercial boom that followed. See Erik Barnouw, The Golden Web: a history of broadcasting in the United States, Volume 11-1933 to 1953 (New York, 1968), p. 126; Laurence Bergreen, Look Now, Pay Later: the rise of network broadcasting (New York, 1980), pp. 123-124; Sydney W. Head and Christopher H. Sterling, Broadcasting in America (Boston, 1978), p. 186; Curtis Mitchell, Cavalcade of Broadcasting (Chicago, 1970), p. 88; Joseph H. Udelson, The Great Television Race: a history of the American te levision industry 1925-1941 (Alabama, 1982), pp. 126-128; Irving Settel, A Pictorial History of Television (New York, 1983), pp. 42-43.

(4.) For more on the 1939 New York World's Fair, see Joseph P. Cusker, The world of tomorrow: science, culture, and community at the New York World's Fair, in H. A. Horrison (ed.), Dawn of a New Day: the New York World's Fair 193 9/40 (New York, 1980), pp. 3-15; David H. Geltner, 1939, The Lost World of the Fair (New York, 1995); Helen H. Harrison, The Fair received: color and lights as elements in design and planning, in Dawn of a New Day: the New York World's Fair 1939/40, op. cit., pp. 43-55; Jeffrey Hart, Yesterday's America of tomorrow, Commentary, July 1985, pp. 62-65; Folke T. Kihlstedt, Utopia realized, the World's Fairs of the 1930s, in J. J. Cohen (ed.), Imagining Tomorrow: history, technology, and the American future (Cambridge, 1986), pp. 97-118; Peter J. Kuznick, Losing the world of tomorrow: the battle over the presentation of science at the 1939 New York World's Fair, American Quarterly, September 1994, pp. 341-373; Francis V. O'Connor, The usable future: the role of fantasy in the promotion of a consumer society for art, in Dawn of a New Day: the New York's World's Fair 1939/40, op. cit., pp. 57-71; Michael Robertson, Cultural hegemony goes to the fair: the case of E. L. Doctorow's World's Fair, American Studies, Spring (1992), pp. 31-44; Robert Rydell, World of Fairs (Chicago, 1993); Eugene A. Santomasso, The design of reason: architecture and planning at the 1939/40 New York World's Fair, in Dawn of a New Day: the New York World's Fair 1939/40, op. cit., pp. 29-40; Warren I. Susman, The people's Fair: cultural contradictions of a consumer society, in Culture as History (New York, 1984), pp. 211-229.

(5.) Official Guide Book of the New York World's Fair 1939 (New York, 1939), P. 41.

(6.) See Cusker, pp. 4-6.

(7.) Rydell, p. 9.

(8.) Official Guide Book, p. 5.

(9.) Ibid., p. 175.

(10.) Ibid., pp. 74-75.

(11.) This attention to the consumer reflects wider economic shifts from an economy based on heavy industry to one increasingly focused on consumption and a cultural shift in which an emerging ideology centered on the consumer challenged the aging Jacksonsian ideal of the producer. See Rita Barnard, The Great Depression and the Culture of Abundance (New York, 1995), pp. 3-3 1; Michael E. Parrish, Anxious Decades: American prosperity and depression, 1920-1941 (New York, 1992), pp. 387-390; Warren I. Susman, Culture as History (New York, 1984).

(12.) Throughout the 1930s, a growing number of people like those behind the Fair placed new hope in technocracy, believing that together social engineers and technology could solve all social problems. See Kihlsredt, p. 98.

(13.) Michael Hare, member of the Fair's Board of Design which shaped the nature of the Fair and its exhibits, stated that the Fair should 'tell the story of the relationships between objects in their everyday use-how they may be used and when purposefully used how they may help us'. Quoted in Cusker, p. 6. Also see New York World's Fair Bulletin, 37 June 1937.

(14.) Kusnick describes in detail the losing battle waged by members of the scientific community who saw the Fair as a valuable opportunity to promote the social value of science and the scientific method against the Fair organizers and corporate exhibitors for whom science at the Fair should mean science applied to produce consumer goods or mystified into entertainment. The subjection of pure science to the interests of the organizers and corporate exhibitors was evidenced, Kusnick argues, by the fact that industrial designers, often trained as Broadway set designers, were hired to plan both focal and industrial exhibits. Scientists were, for the most part, excluded.

(15.) Official Guide Book, p. 41.

(16.) Rydell, p. 132.

(17.) Official Guide Book, p. 5.

(18.) Grover Whalen, What the Fair means to business and industry, New York World's Fair Bulletin, June 1937, p. 1.

(19.) Ibid.

(20.) In addressing leaders in the communications industry, for example, Whalen asserted that 'Every branch

of communications will undoubtedly be financially benefited directly and indirectly from the Fair, not only during the period of the Fair but before and after it.' New York World's Fair Press Release No. 96, 19 March 1937, p. 2. National Broadcasting Papers, State Historical Society of Wisconsin, Madison (hereafter NBC) 55/65. All NBC memos, correspondences, departmental reports, and press releases cited in this article are from the SHSW archives.

(21.) According to Fortune, 'during 1938 there was scarcely a convention that did not feature an address on public relations, scarcely a trade magazine that did not devote some space to the subject, scarcely a board of directors that did not deliberate weightily on the powers of the new goddess'. The public is nor dammed, Fortune, March 1939, p. 83.

(22.) Ibid., p. 85.

(23.) Howard Wood, Business must 'sell' itself, Nation's Business, January 1938, p. 27. Also see Business-and-government: American business can avoid committing suicide only by practicing some sound public relations, Fortune, March 1939, pp. 57-58; Public relations as good business, Business Week, 18 February 1939, pp. 50-51.

(24.) Cusker, p. 4.

(25.) Official Guide Book, p. 107.

(26.) Ibid., p. 205.

(27.) GE advertisement, Newsweek, I May 1939, p. 47.

(28.) Sealtest advertisement, Nation's Business, April 1939, p. 10. For more on industry's use of public service rhetoric, see New York Fair portrays triumph of industry, Nation's Business, April 1939, pp. 52-54+.

(29.) The public is not dammed, p. 110.

(30.) Official Guide Book, p. 209.

(31.) Roland Marchand, The designers go to the Fair II: Norman Bel Geddes, the General Motors 'Futurama,' and the visit to the factory transformed, Design Issues, Spring (1992), p. 35. Also see Roland Marchand, The designers go to the Fair: Walter Teague and the professionalization of corporate industrial exhibits, 1933-1940, Design Issues, Fall (1991), pp. 4-17.

(32.) Kihlstedt, p. 107.

(33.) Except for buses, there were no means of mass transit in GM's vision of 1960s America. Meanwhile in the same period, GM was buying up streetcar systems nationwide, dismantling them, and replacing them with buses. See Jeffrey L. Meikle, Twentieth-Century Limited: industrial design in America, 1925-1939 (Philidelphia, 1979), p. 207.

(34.) As of 15 November 1938, RCA had estimated that total cost for the building, landscaping, equipment, decorations, furnishings, exhibits, and operation would be $300,000. Breakdown of cost for R.C.A. participation in New York World's Fair 1939, 15 November 1938, NBC 63/7.

(35.) Minutes, World's fair Committee Meeting, 30 August 1938, NBC 63/7.

(36.) Lenox R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20, p. 1.

(37.) RCA Press Release, 16 August 1938, NBC 63/6.

(38.) Minutes, World's Fair Committee Meeting, 30 August 1938, NBC 63/7.

(39.) J.D'Agostino, Memo to C.W. Fitch, 18 August 1938, NBC 63/7.

(40.) A press release, officially announcing RCA's participation in the Fair, for example, emphasized that the agreement signed between RCA and the Fair Corporation guaranteed that television would be a major attraction. NBC and RCA participation in New York's World's Fair announced by David Sarnoff, New Story Release, 16 June 1937, NBC 55/65; further, at the earliest stages, RCA thought of building the theme of its entire exhibit around television and/or having a separate television building. Frank B. Mullen (RCA Public Relations Chief), Memo to Clay Morgan, 23 April 1937, NBC 55/66.

(41.) David Sarnoff, Statement on television, presented at the Annual Meeting of RCA Stockholders, 7 May 1935, NBC 102/4.

(42.) David Sarnoff, Statement before the Federal Communications Commission, 14 November 1938, NBC 60/41.

(43.) Lenox R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20, p. 1.

(44.) By the early 1940s industry agreement over standards would erode with CBS's push for color television.

(45.) On 1 May, the day after the opening ceremonies and NBC's purportedly landmark telecast. RCA sets went on sale in downtown department stores. RCA's line of receivers joined those manufactured by American Television Corp., Westinghouse, Du Mont, Andrea Pilot, and others. Some dealers prepared darkened demonstration booths to best show television to the public. At the beginning of May, NBC planned to broadcast similar, if not the same, filmed programs at 15-minute intervals for the benefit of dealers as they were for the receivers at the Fair. Set prices ranged between $160 to over $1000. At the same time, a newspaper advertising campaign went into full swing. In the weekend of the Fair's opening, RCA placed ads in five New York papers. The ads, some in color, all had pictures of available models, prices, and a coupon which interested readers could send in for more information. Other companies like Macy's, DaVega and Westinghouse also placed ads with copy such as 'Television has its "coming-out-party" Sund ay' and 'HEAR the opening of the N.Y. WORLD'S FAIR VIA RADIO ... SEE President Roosevelt open the N.Y. WORLD'S FAIR VIA TELEVISION'. Television ads to break, New York Times, 21 April 1939, p. 34; Curtain goes up on television, Business Week, 6 May 1939, p. 15.

(46.) Press clipping. Public television to start in spring, New York Times, 21 October 1938, NBC 102/22.

(47.) In the Fair's second season (1940), Du Mont installed its latest television receivers in the Crosley Appliance Building.

(48.) Lenox R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20, p. 5.

(49.) J.D'Agostino, Memo to C.W. Fitch, 18 August 1938, NBC 63/7.

(50.) Lenox R. Lohr, Memo to R. R. Beal, 20 October 1938, NBC 63/6.

(51.) Minutes, World's Fair Committee Meeting, 30 August 1938, NBC 63/7. When the Fair opened, however, television receivers would only be 9 X 12.

(52.) Minutes, World's Fair Committee, 13 December 1938, NBC 63/7.

(53.) NBC Report, Television activity summary, March 1939, NBC 102/33.

(54.) Ibid.; in the 1940 season, RCA would include a 'Television Suite incorporating ten separate, air-conditioned viewing rooms furnished as typical American living-rooms where television may be seen under circumstance approximating those in the home'. The revised television displays in 1940 also included 'two television pick-up locations in the specially landscaped Television Garden and in an indoor studio'. Executive Vice President, Memo to all RCA New York employees, 15 May 1940, NBC 79/20.

(55.) Lenox R. Lohr, Memo to R.R Beal, 20 October 1938, NBC 63/6; also see J.D'Agostino, Letter to Douglas Crone, 1 August 1938, NBC 63/6.

(56.) Lenox R. Lohr, Memo to R.R. Beal, 20 October 1938, NBC 6316.

(57.) Engineering Department Report, May 1939, NBC 206/19. Also see Orrin E. Dunlap, Ceremony is carried by television as industry makes its formal bow, New York Times. 1 May 1939, p. 8; Visitors rake part in television show, New York Times, 4 May 1939, p. 19; Lenox, R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20.

(58.) Lenox R. Lohr, Memo to R. R Beal, 20 October 1938, NBC Archives 63/6.

(59.) In the 1940 season, GM and RCA would join efforts to demonstrate a working prototype of a 'telephone of tomorrow' which joined television technology with phone service. The presentation was widely covered and closely tied to military purposes. One of the most touted applications would be for government use at times of crisis. Fears generated by Nazi success in deceiving Allied forces in the North Sea with fake messages made the idea of a visual link attractive. GM stated that the demonstration showed 'how television may in the future be used for utilitarian as well as entertainment purposes'-- a comment that suggests how television was otherwise being promoted at the Fair. Milton Bracker, Television phone shown, New York Times, 18 June 1940, p. 28.

(60.) See Warren Susman, pp. 211-229.

(61.) Press clipping, Television trucks set up at the Fair, New York Times, 18 November 1938, NBC 102/22. Just days later, scenes of murals and statues from the Fair were sent the seven and a half miles to the NBC studio at Radio City. Spectators reportedly described the 'telepictures' as very good. The engineers were equally pleased with the transmission, since it was raining and the cameras had to work with relatively poor light.

(62.) Two 'firsts' marked up by the World's Fair, New York Times, 28 February 1939, p. 1.

(63.) Other participants in the dedication ceremony included James G. Harbord, chairman of the board of RCA: Neville Miller, president of the NAB; and Vladimir Zworykin; Dedication of RCA seen on television, New York Times, 21 April 1939, p. 21.

(64.) Throughout the spring NBC had been offering programming like the RCA dedication, boxing, and other studio produced shows, but regular programming officially started with the Fair.

(65.) The opening day telecast kicked off 'television week' in New York, during which NBC broadcast 25 hours of programming, Dunlap, 1 May 1939, p. 8.

(66.) Ibid., p. 8.

(67.) Observers from the BBC were amazed by 'the nerve' of NBC to use only one camera. The fear of technical difficulties alone would have convinced them to use multiple cameras. The problem of close ups was precipitated by the Secret Service's refusal to allow television cameras close to the podium while the president spoke. See ibid., p. 8, Orrin E. Dunlap. Act I reviewed, New York Times, 7 May 1939, p. 12; Gerald Cock, My impressions of American television, Television and Short Wave World, August 1939, p. 453.

(68) Dunlap, 7 May 1939, p. 12.

(69.) Dunlap, 1 May 1939, p. 8; When NBC camera crews returned to cover the 1940 re-opening for the Fair they did have more cameras, and close ups. See Radio will carry opening ceremony, New York Times 5 May 1940, p. 46.

(70.) Lenox R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20, p. 5. Exhibits like this one were, Lohr argued, 'the best known methods in motivated visual presentations to the ultimate consumer as conceived by industry'.

(71.) See Robert Rosenblum Remembrance of Fairs past, in the Queens Museum (ed.), Remembering the Future the New York World's Fair from 1939 to 1964, (New York, 1989), p. 15.

(72.) Internal memos also suggest that RCA examined how the exhibit could promote improved relationships with dealers, distributors and sales organizations. See Lenox R. Lohr, Memo to Sarnoff, 1 June 1939, NBC 79/20, p. 1.

(73.) Dedication of RCA seen on television, New York Times, 21 April 1939, p. 16.

(74.) Kihlstedt, p. 111.

(75.) An advertisement for RCA's World's Fair exhibit, for example, uses Rip Van Winkle as a narrative device to tell 'The story of the services of RCA!' A modem day Van Winkle falls asleep in 1901 and awakens to suddenly find himself in 1939. The ad's readers then follow Van Winkle as he explores the strange new world of his future (their present) and discovers the marvelous inventions RCA has given society. In the final frame, Van Winkle encounters television--the latest innovation from RCA. Suddenly Van Winkle's future and that of the 1939 readers merge in the today of RCA's exhibit at the 1939 World's Fair. An adventure in discovery, advertisement by Radio Corporation of America, New York Times, 5 March 1939, World's Fair Section, pp. 36-37.

(76.) Several articles about television played with the same tension. A New Yorker article copies the strategy of GM's Futurama as it is written from the perspective of 1965. Instead of a world where television has blossomed, the writer gives a mock historical look at the rise and fall of television. The history reports on the dramatic changes television made to the American landscape and way of life. According to this history, the television industry ended in the aftermath of a televised Orson Wells expletive. The article offers a fascinating example of how television's introduction was negotiated through the tension between today and tomorrow. Russell Maloney, The age of television, New Yorker, 27 July 1940, pp. 22-23. Also see Waldemar Kaempffert, Look what's ahead, American Magazine, May 1939, pp. 14-15+. According to the article's introduction, Kaempffert's forward-looking discussion of television 'has that rare quality of imagination which makes the miracles of tomorrow live today' (p. 14). Kaempffert p aints a picture of a future in which, among many fanciful things, television serves as a virtual-reality-like means of communication by which two people across the globe from each other will be able to 'shake hands electronically' (p. 81).

(77.) Television causes traffic problem, p. 20. GE workers were reportedly embarrassed, for while sets were currently being manufactured, they hadn't yet arrived in stores and prices were still under discussion.

(78.) Harry Gordon, Letter to Frank E. Mullin, 10 January 1941, NBC 103/21.

(79.) The questionnaire used in the 1940 survey and its results are provided in the 10 January 1941 letter to Frank Mullin. While I did not find a copy of the first survey, the 8-page memo systematically compares the results of the two.

(80.) See What shows pulled at the Fair?, Business Week, 4 November 1939, p. 22; Susman, p. 21; Gelernter, p. 159.

(81.) Television Report, 30 October 1939, NBC 103/17; Susman, p. 22. Also see What's television doing now?, Business Week, 12 August 1939, pp. 24-25.

(82.) Orrin E. Dunlap, Act I Scene I, New York Times, 19 March 1939, pp. XI. 12.

(83.) Television, Life, 20 February 1939, p. 45.

(84.) See Irving Fiske, Where does television belong, Harper's Magazine, February 1949, pp. 265-269; Alva Johnston, Now what can we do with television, Saturday Evening Post, 30 May 1939, pp. 20-21 +; Denver Lindley, Before your very eyes, Collier's, 18 March 1939, pp. 12-13 +; Television: a $13,000,000 'if', Fortune, April 1939, pp. 52-59 +: Too early for television? Time, 15 April 1939, p. 81; Francis X. Welch, The economic birth pangs of television, Nation's Business, June 1940, pp. 20-21 +.

The Radio Act of 1927

Public Law No. 632, February 23, 1927, 69th Congress. An Act for the regulation of radio communications, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

That this Act is intended to regulate all forms of interstate and foreign radio transmissions and communications within the United States, its Territories and possessions; to maintain the control of the United States over all the channels of interstate and foreign radio transmission; and to provide for the use of such channels, but not the ownership thereof, by individuals, firms, or corporations, for limited periods of time, under licenses granted by Federal authority, and no such license shall be construed to create any right, beyond the terms, conditions, and periods of the license. That no person, firm, company, or corporation shall use or operate any apparatus for the transmission of energy or communications or signals by radio (a) from one place in any Territory or possession of the United States, or from the District of Columbia to another place in the same Territory, possession or District; or (b) from any State, Territory, or possession of the United States, or from the District of Columbia to any other State, Territory, or Possession of the United States; or from any place in any State, Territory, or possession of the United States, or in the District of Columbia, to any place in any foreign country or to any vessel; or (d) within any State when the effects of such use extend beyond the borders of said State, or when interference is caused by such use or operation with the transmission of such energy, communications, or signals from within said State to any place beyond its borders, or from any place beyond its borders to any place within said State, or with the transmission or reception of such energy, communications, or signals from and/or to places beyond the borders of said State; or (e) upon any vessel of the United States; or (f) upon any aircraft or other mobile stations within the United States, except under and in accordance with this Act and with a license in that behalf granted under the provisions of this Act.

SEC. 2. For the purposes of this Act, the United States is divided into five zones, as follows: The first zone shall embrace the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, the District of Columbia, Porto Rico, and the Virgin Islands; the second zone shall embrace the States of Pennsylvania, Virginia, West Virginia, Ohio, Michigan, and Kentucky; the third zone shall embrace the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississippi, Arkansas, Louisiana, Texas, and Oklahoma; the fourth zone shall embrace the States of Indiana, Illinois, Wisconsin, Minnesota, North Dakota, South Dakota, Iowa, Nebraska, Kansas, and Missouri; and the fifth zone shall embrace the States of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, the Territory of Hawaii, and Alaska.

SEC. 3. That a commission is hereby created and established to be known as the Federal Radio Commission, hereinafter referred to as the commission, which shall be composed of five commissioners appointed by the President, by and with the advice and consent of the Senate, and one of whom the President shall designate as chairman: *Provided,* That chairmen thereafter elected shall be chosen by the commission itself.

Each member of the commission shall be a citizen of the United States and an actual resident citizen of a State within the zone from which appointed at the time of said appointment. Not more than one commissioner shall be appointed from any zone. No member of the commission shall be financially interested in the manufacture or sale of radio apparatus or in the transmission or operation of radiotelegraphy, radio telephony, or radio broadcasting. Not more than three commissioners shall be members of the same political party.

The first commissioners shall be appointed for the terms of two, three, four, five, and six years, respectively, from the date of the taking effect of this Act, the term of each to be designated by the President, but their successors shall be appointed for terms of six years, except that any person chosen to fill a vacancy shall be appointed only for the unexpired term of the commissioner whom he shall succeed.

The first meeting of the commission shall be held in the city of Washington at such time and place as the chairman of the commission may fix. The commission shall convene thereafter at such times and places as a majority of the commission may determine, or upon call of the chairman thereof.

The commission may appoint a secretary, and such clerks, special counsel, experts, examiners, and other employees as it may from time to time find necessary for the proper performance of its duties and as from time to time may be appropriated for by Congress.

The commission shall have an official seal and shall annually make a full report of its operations to the Congress.

The members of the commission shall receive a compensation of $10,000 for the first year of their service, said year to date from the first meeting of said commission, and thereafter a compensation of $30 per day for each day's attendance upon sessions of the commission or while engaged upon work of the commission and while traveling to and from such sessions, and also their necessary traveling expenses.

SEC. 4. Except as otherwise provided in this Act, the commission, from time to time, as public convenience, interest, or necessity requires, shall--

(a) Classify radio stations;

(b) Prescribe the nature of the service to be rendered by each class of licensed stations and each station within any class;

(c) Assign bands of frequencies or wave lengths to the various classes of stations, and assign frequencies or wave lengths for each individual station and determine the power which each station shall use and the time during which it may operate;

(d) Determine the location of classes of stations or individual stations;

(e) Regulate the kind of apparatus to be used with respect to its external effects and the purity and sharpness of the emissions from each station and from the apparatus therein;

(f) Make such regulations not inconsistent with law as it may deem necessary to prevent interference between stations and to carry out the provisions of this Act: *Provided, however,* That changes in the wave lengths, authorized power, in the character of emitted signals, or in the times of operation of any station, shall not be made without the consent of the station licensee unless, in the judgment of the commission, such changes will promote public convenience or interest or will serve public necessity or the provisions of this Act will be more fully complied with;

(g) Have authority to establish areas or zones to be served by any station;

(h) Have authority to make special regulations applicable to radio stations engaged in chain broadcasting;

(i) Have authority to make general rules and regulations requiring stations to keep such records of programs, transmissions of energy, communications, or signals as it may deem desirable;

(j) Have authority to exclude from the requirements of any regulations in whole or in part any radio station upon railroad rolling stock, or to modify such regulations in its discretion;

(k) Have authority to hold hearings, summon witnesses, administer oaths, compel the production of books, documents, and papers and to make such investigations as may be necessary in the performance of its duties. The commission may make such expenditures (including expenditures for rent and personal services at the seat of government and elsewhere, for law books, periodicals, and books of reference, and for printing and binding) as may be necessary for the execution of the functions vested in the commission and, as from time to time may be appropriated for by Congress. All expenditures of the commission shall be allowed and paid upon the presentation of itemized vouchers therefor approved by the chairman.

SEC. 5. From and after one year after the first meeting of the commission created by this Act, all the powers and authority vested in the commission under the terms of this Act, except as to the revocation of licenses, shall be vested in and exercised by the Secretary of commerce; except that thereafter the commission stall have power and jurisdiction to act upon and determine any and all matters brought before it under the terms of this section.

It shall also be the duty of the Secretary of Commerce--

(A) For and during a period of one year from the first meeting of the commission created by this Act, to immediately refer to the commission all applications for station licenses or for the renewal or modification of existing station licenses.

(B) From and after one year from the first meeting of the commission created by this Act, to refer to the commission for its action any application for a station license or for the renewal or modification of any existing station license as to the granting of which dispute, controversy, or conflict arises or against the granting of which protest is filed within ten days after the date of filing said application by any party in interest and any application as to which such reference is requested by the applicant at the time of filing said application.

(C) To prescribe the qualifications of station operators, to classify them according to the duties to be performed, to fix the forms of such licenses, and to issue them to such persons as he finds qualified.

(D) To suspend the license of any operator for a period not exceeding two years upon proof sufficient to satisfy him that the licensee (a) has violated any provision of any Act or treaty binding on the United States which the Secretary of commerce or the commission is authorized by this Act to administer or by any regulation made by the commission or the Secretary of Commerce under any such Act or treaty; or (b) has failed to carry out the lawful orders of the master of the vessel on which he is employed; or (c) has willfully damaged or permitted radio apparatus to be damaged; or (d) has transmitted superfluous radio communications or signals or radio communications containing profane or obscene words or language; or (e) has willfully or maliciously

interfered with any other radio communications or signals.

(E) To inspect all transmitting apparatus to ascertain whether in construction and operation it conforms to the requirements of this Act, the rules and regulations of the licensing authority, and the license under which it is constructed or operated.

(F) To report to the commission from time to time any violations of this Act, the rules, regulations, or orders of the commission, or of the terms or conditions of any license.

(G) To designate call letters of all stations.

(H) To cause to be published such call letters and such other announcements and data as in his judgment may be required for the efficient operation of radio stations subject to the jurisdiction of the United States and for the proper enforcement of this Act.

The Secretary may refer to the commission at any time any matter the determination of which is vested in him by the terms of this Act.

Any person, firm, company, or corporation, any State or political division thereof aggrieved or whose interests are adversely affected by any decision, determination, or regulation of the Secretary of Commerce may appeal therefrom to the commission by filing with the Secretary of Commerce notice of such appeal within thirty days after such decision or determination or promulgation of such regulation. All papers, documents, and other records pertaining to such application on file with the Secretary shall thereupon be transferred by him to the commission. The commission shall hear such appeal de novo under such rules and regulations as it may determine.

Decisions by the commission as to matters so appealed and as to all other matters over which it has jurisdiction shall be final, subject to the right of appeal herein given.

No station license shall be granted by the commission or the Secretary of Commerce until the applicant therefor shall have signed a waiver of any claim to the use of any particular frequency or wave length or of the ether as against the regulatory powers of the United States because of the previous use of the same, whether by license or otherwise.

SEC. 6. Radio stations belonging to and operated by the United States shall not be subject to the provisions of sections 1, 4, and 5 of this Act. All such Government stations shall use such frequencies or wave lengths as shall be assigned to each or to each class by the President. All such stations, except stations on board naval and other Government vessels while at sea or beyond the limits of the continental United States, when transmitting any radio communication or signal other than a communication or signal relating to Government business shall conform to such rules and regulations designed to prevent interference with other radio stations and the rights of others as the licensing authority may prescribe. Upon proclamation by the President that there exists war or a threat of war or a state of public peril or disaster or other national emergency, or in order to preserve the neutrality of the United States, the President may suspend or amend, for such time as he may see fit, the rules and regulations applicable to any or all stations within the jurisdiction of the United States as prescribed by the licensing authority, and may cause the closing of any station for radio communication and the removal therefrom of its apparatus and equipment, or he may authorize the use of control of any such station and/or its

apparatus and equipment by any department of the Government under such regulations as he may prescribe, upon just compensation to the owners. Radio stations on board vessels of the United States Shipping Board or the United States Shipping Board Emergency Fleet Corporation or the Inland and Coastwise Waterways Service shall be subject to the provisions of this Act.

SEC. 7. The President shall ascertain the just compensation for such use or control and certify the amount ascertained to Congress for appropriation and payment to the person entitled thereto. If the amount so certified is unsatisfactory to the person entitled thereto, such person shall be paid only 75 per centum of the amount and shall be entitled to sue the United States to recover such further sum as added to such payment of 75 per centum which will make such amount as will be just compensation for the use and control. Such suit shall be brought in the manner provided by paragraph 20 of section 24, or by section 145 of the Judicial Code, as amended.

SEC. 8. All stations owned and operated by the United States, except mobile stations of the Army of the United States, and all other stations on land and sea, shall have special call letters designated by the Secretary of Commerce.

Section 1 of this Act shall not apply to any person, firm, company, or corporation sending radio communications or signals on a foreign ship while the same is within the jurisdiction of the United States, but such communications or signals shall be transmitted only in accordance with such regulations designed to prevent interference as may be promulgated under the authority of this Act.

SEC. 9. The licensing authority, if public convenience interest, or necessity will be served thereby, subject to the limitations of this Act, shall grant to any applicant therefor a station license provided for by this Act.

In considering applications for licenses and renewals of licenses, when and in so far as there is a demand for the same, the licensing authority shall make such a distribution of licenses, bands of frequency of wave lengths, periods of time for operation, and of power among the different States and communities as to give fair, efficient, and equitable radio service to each of the same.

No license granted for the operation of a broadcasting station shall be for a longer term than three years and no license so granted for any other class of station shall be for a longer term than five years, and any license granted may be revoked as hereinafter provided. Upon the expiration of any license, upon application therefor, a renewal of such license may be granted from time to time for a term of not to exceed three years in the case of broadcasting licenses and not to exceed five years in the case of other licenses.

No renewal of an existing station license shall be granted more than thirty days prior to the expiration of the original license.

SEC. 10. The licensing authority may grant station licenses only upon written application therefor addressed to it. All applications shall be filed with the Secretary of Commerce. All such applications shall set forth such facts as the licensing authority by regulation may prescribe as to the citizenship, character, and financial, technical, and other qualifications of the applicant to operate the station; the ownership and location of the proposed station and of the stations, if any, with which it is proposed to communicate; the frequencies or wave lengths and the power desired to be used; the hours of the day or other periods of time during which it is proposed to operate the station; the purposes for which the station is to be used; and such other information as it may require. The licensing authority at any time after the filing of such original application and during the term of any such license may require from an applicant or licensee further written statements of fact to enable it to determine whether such original application should be granted or denied or such license revoked. Such application and/or such statement of fact shall be signed by the applicant and/or licensee under oath or

affirmation.

The licensing authority in granting any license for a station intended or used for commercial communication between the United States or any Territory or possession, continental or insular, subject to the jurisdiction of the United States, and any foreign country, may impose any terms, conditions, or restrictions authorized to be imposed with respect to submarine-cable licenses by section 2 of an Act entitled "An Act relating to the landing and the operation of submarine cables in the United States," approved May 24, 1921.

SEC. 11. If upon examination of any application for a station license or for the renewal or modification of a station license the licensing authority shall determine that public interest, convenience, or necessity would be served by the granting thereof, it shall authorize the issuance, renewal, or modification thereof in accordance with said finding. In the event the licensing authority upon examination of any such application does not reach such decision with respect thereto, it shall notify the applicant thereof, shall fix and give notice of a time and place for hearing thereon, and shall afford such applicant an opportunity to be heard under such rules and regulations as it may prescribe.

Such station licenses as the licensing authority may grant shall be in such general form as it may prescribe, but each license shall contain, in addition to other provisions, a statement of the following conditions to which such license shall be subject:

(A) The station license shall not vest in the licensee any right to operate the station nor any right in the use of the frequencies or wave length designated in the license beyond the term thereof nor in any other manner than authorized therein.

(B) Neither the license nor the right granted thereunder shall be assigned or otherwise transferred in violation of this Act.

(C) Every license issued under this Act shall be subject in terms to the right of use or control conferred by section 6 hereof.

In cases of emergency arising during the period of one year from and after the first meeting of the commission created hereby, or on applications filed during said time for temporary changes in terms of licenses when the commission is not in session and prompt action is deemed necessary, the Secretary of Commerce shall have authority to exercise the powers and duties of the commission, except as to revocation of licenses, but all such exercise of powers shall be promptly reported to the members of the commission, and any action by the Secretary authorized under this paragraph shall continue in force and have effect only until such time as the commission shall act thereon.

SEC. 12 Any station license shall be revocable by the commission for false after the granting thereof such license shall not be transferred in any manner, either voluntarily or involuntarily, to (a) any alien or the representative of any alien; (b) to any foreign government, or the representative thereof; (c) to any company, corporation, or association organized under the laws of any foreign government; (d) to any company, corporation, or association of which any officer or director is an alien, or of which more than one-fifth of the capital stock may be voted by aliens or their representatives or by a foreign government or representative thereof, or by any company, corporation, or association organized under the laws of a foreign country.

The station license required hereby, the frequencies or wave length or lengths authorized to be used by the licensee, and the rights therein granted shall not be transferred, assigned, or in any manner, either voluntarily or involuntarily, disposed of to any person, firm, company, or corporation without the consent in writing of the

licensing authority.

SEC. 13 The licensing authority is hereby directed to refuse a station license and/or the permit hereinafter required for the construction of a station to any person, firm, company, or corporation, or any subsidiary thereof, which has been finally adjudged guilty by a Federal court of unlawfully monopolizing or attempting unlawfully to monopolize, after this Act takes effect, radio communication, directly or indirectly, through the control of the manufacture or sale of radio apparatus, through exclusive traffic arrangements, or by any other means or to have been using unfair methods of competition. The granting of a license shall not estop the United States or any person aggrieved from proceeding against such person, firm, company, or corporation for violating the law against unfair methods of competition or for a violation of the law against unlawful restraints and monopolies and/or combinations, contracts, or agreements in restraint of trade, or from instituting proceedings for the dissolution of such firm, company, or corporation.

SEC. 14. Any station license shall be revocable by the commission for false statements either in the application or in the statement of fact which may be required by section 10 hereof, or because of conditions revealed by such statements of fact as may be required from time to time which would warrant the licensing authority in refusing to grant a license on an original application, or for failure to operate substantially as set forth in the license, for violation of or failure to observe any of the restrictions and conditions of this Act, or of any regulation of the licensing authority authorized by this Act or by a treaty ratified by the United States, or whenever the Interstate Commerce Commission, or any other Federal body in the exercise of authority conferred upon it by law, shall find and shall certify to the commission that any licensee bound so to do, has failed to provide reasonable facilities for the transmission of radio communications, or that any licensee has made any unjust and unreasonable charge, or has been guilty of any discrimination, either as to charge or as to service or has made or prescribed any unjust and unreasonable classification, regulation, or practice with respect to the transmission of radio communications or service: *Provided,* That no such order of revocation shall take effect until thirty days' notice in writing thereof, stating the cause for the proposed revocation, has been given to the parties known by the commission to be interested in such license. Any person in interest aggrieved by said order may make written application to the commission at any time within said thirty days for a hearing upon such order, and upon the filing of such written application said order of revocation shall stand suspended until the conclusion of the hearing herein directed. Notice in writing of said hearing shall be given by the commission to all the parties known to it to be interested in such license twenty days prior to the time of said hearing. Said hearing shall be conducted under such rules and in such manner as the commission may prescribe. Upon the conclusion hereof the commission may affirm, modify, or revoke said orders of revocation.

SEC. 15 All laws of the United States relating to unlawful restraints and monopolies and to combinations, contracts, or agreements in restraint of trade are hereby declared to be applicable to the manufacture and sale of and to trade in radio apparatus and devices entering into or affecting interstate or foreign commerce and to interstate or foreign radio communications. Whenever in any suit, action, or proceeding, civil or criminal, brought under the provisions of any of said laws or in any proceedings brought to enforce or to review findings and orders of the Federal Trade Commission or other governmental agency in respect of any matters as to which said commission or other governmental agency is by law authorized to act, any licensee shall be found guilty of the violation of the provisions of such laws or any of them, the court, in addition to the penalties imposed by said laws, may adjudge, order, and/or decree that the license of such licensee shall, as of the date the decree or judgment becomes finally effective or as of such other date as the said decree shall fix, be revoked and that all rights under such license shall thereupon cease: *Provided, however,* That such licensee shall have the same right of appeal or review as is provided by law in respect of other decrees and judgments of said court.

SEC. 16 Any applicant for a construction permit, for a station license, or for the renewal or modification of an existing station license whose application is refused by the licensing authority shall have the right to appeal from said decision to the Court of Appeals of the District of Columbia; and any licensee whose license is

revoked by the commission shall have the right to appeal from such decision of revocation to said Court of Appeals of the District of Columbia or to the district court of the United States in which the apparatus licensed is operated, by filing with said court, within twenty days after the decision complained of is effective, notice in writing of said appeal and of the reasons therefor.

The licensing authority from whose decision an appeal is taken shall be notified of said appeal by service upon it, prior to the filing thereof, of a certified copy of said appeal and of the reasons therefor. Within twenty days after the filing of said appeal the licensing authority shall file with the court the originals or certified copies of all papers and evidence presented to it upon the original application for a permit or license or in the hearing upon said order of revocation, and also a like copy of its decision thereon and a full statement in writing of the facts and the grounds for its decision as found and given by it. Within twenty days after the filing of said statement by the licensing authority either party may give notice to the court of his desire to adduce additional evidence. Said notice shall be in the form of a verified petition stating the stating the nature and character of said additional evidence, and the court may thereupon order such evidence to be taken in such manner and upon such terms and conditions as it may deem proper.

At the earliest convenient time the court shall hear, review, and determine the appeal upon said record and evidence, and may alter or revise the decision appealed from and enter such judgment as to it may seem just. The revision by the court shall be confined to the points set forth in the reasons of appeal.

SEC. 17. After the passage of this Act no person, firm, company, or corporation now or hereafter directly or indirectly through any subsidiary, associated, or affiliated person, firm, corporation, or agent, or otherwise, in the business of transmitting and/or receiving for hire energy, communications, or signals by radio in accordance with the terms of the license issued under this Act, shall by purchase, lease, construction, or otherwise, directly or indirectly, acquire, own, control, or operate any cable or wire telegraph or telephone line or system between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other assets of any such cable, wire, telegraph, or telephone line or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States or in the District of Columbia and any place in any foreign country, or unlawfully to create monopoly in any line of commerce; nor shall any person, firm, company, or corporation now or hereafter engaged directly or indirectly through any subsidiary, associated, or affiliated person, company, corporation, or agent, or otherwise, in the business of transmitting and/or receiving for hire messages by any cable, wire, telegraph, or telephone line or system (a) between any place in any State Territory, or possession of the United States or in the District of Columbia, and any place in any other State, Territory, or possession of the United States, or the District of Columbia, and any place in any foreign country, by purchase, lease, construction, or otherwise, directly or indirectly acquire, own, control, or operate any station or the apparatus therein, or any system for transmitting and/or receiving radio communications or signals between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or shall acquire, own, or control any part of the stock or other capital share or any interest in the physical property and/or other assets of any such radio station, apparatus, or system, if in either case the purpose is and/or the effect thereof may be to substantially lessen competition or to restrain commerce between any place in any State, Territory, or possession of the United States or in the District of Columbia, and any place in any foreign country, or unlawfully to create monopoly in any line of commerce.

SEC. 18. If any licensee shall permit any person who is a legally qualified candidate for any public office to use a broadcasting station, he shall afford equal opportunities to all other such candidates for that office in the use of such broadcasting station, and the licensing authority shall make rules and regulations to carry this provision into effect: *Provided,* That such licensee shall have no power of censorship over the material broadcast under the provisions of this paragraph. No obligation is hereby imposed upon any licensee to allow

the use of its station by any such candidate.

SEC. 19. All matter broadcast by any radio station for which service, money, or any other valuable consideration is directly or indirectly paid, or promised to or charged or accepted by, the station so broadcasting, from any person, firm, company, or corporation, shall, at the time the same is so broadcast, be announced as paid for or furnished, as the case may be, by such person, firm, company, or corporation.

SEC. 20. The actual operation of all transmitting apparatus in any radio station for which a station license is required by this Act shall be carried on only by a person holding an operator's license issued hereunder. No person shall operate any such apparatus in such station except under and in accordance with an operator's license issued to him by the Secretary of Commerce.

SEC. 21. No license shall be issued under the authority of this Act for the operation of any station the construction of which is begun or is continued after this Act takes effect, unless a permit for its construction has been granted by the licensing authority upon written application therefor. The licensing authority may grant such permit if public convenience, interest, or necessity will be served by the construction of the station. This application shall set forth such facts as the licensing authority by regulation may prescribe as to the citizenship, character, and the financial, technical, and other ability of the applicant to construct and operate the station, the ownership and location of the proposed station and of the station or stations with which it is proposed to communicate, the frequencies and wave length or wave lengths desired to be used, the hours of the day or other periods of time during which it is proposed to operate the station, the purpose for which the station is to be used, the type of transmitting apparatus to be used, the power to be used, the date upon which the station is expected to be completed and in operation, and such other information as the licensing authority may require. Such application shall be signed by the applicant under oath or affirmation.

Such permit for construction shall show specifically the earliest and latest dates between which the actual operation of such station is expected to begin, and shall provide that said permit will be automatically forfeited if the station is not ready for operation within the time specified or within such further time as the licensing authority may allow, unless prevented by causes not under the control of the grantee. The rights under any such permit shall not be assigned or otherwise transferred to any person, firm, company, or corporation without the approval of the licensing authority. A permit for construction shall not be required for Government stations, amateur stations, or stations upon mobile vessels, railroad rolling stock, or aircraft. Upon the completion of any station for the construction or continued construction for which a permit has been granted, and upon it being made to appear to the licensing authority that all the terms, conditions, and obligations set forth in the application and permit have been fully met, and that no cause or circumstance arising or first coming to the knowledge of the licensing authority since the granting of the permit would, in the judgment of the licensing authority, make the operation of such station against the public interest, the licensing authority shall issue a license to the lawful holder of said permit for the operation of said station. Said license shall conform generally to the terms of said permit.

SEC. 22. The licensing authority is authorized to designate from time to time radio stations the communications or signals or which, in its opinion, are liable to interfere with the transmission or reception of distress signals of ships. Such stations are required to keep a licensed radio operator listening in on the wave lengths designated for signals of distress and radio communications relating thereto during the entire period the transmitter of said station is in operation.

SEC. 23. Every radio station on shipboard shall be equipped to transmit radio communications or signals of distress on the frequency or wave length specified by the licensing authority, with apparatus capable of transmitting and receiving messages over a distance of at least one hundred miles by day or night. When sending radio communications or signals of distress and radio communications relating thereto the transmitting

set may be adjusted in such a manner as to produce a maximum of radiation irrespective of the amount of interference which may thus be cause.

All radio stations, including Government stations and stations on board foreign vessels when within the territorial waters of the United States, shall give absolute priority to radio communications or signals relating to ships in distress, shall cease all sending on frequencies or wave lengths which will interfere with hearing a radio communication or signal of distress, and, except when engaged in answering or aiding the ship in distress, shall refrain from sending any radio communications or signals until there is assurance that no interference will be caused with the radio communications or signals relating thereto, and shall assist the vessel in distress, so far as possible, by complying with its instructions.

SEC. 24. Every shore station open to general public service between the coast and vessels at sea shall be bound to exchange radio communications or signals with any ship station without distinction as to radio systems or instruments adopted by such stains, respectively, and each station on shipboard shall be bound to exchange radio communications or signals with any other station on shipboard without distinction as to radio systems or instruments adopted by each station.

SEC. 25 At all places where Government and private or commercial radio stations on land operate in such close proximity than interference with the work of Government stations can not be avoided when they are operating simultaneously such private or commercial stations as do interfere with the transmission or reception of radio communications or signals by the Government stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time.

The Government stations for which the above-mentioned division of time is established shall transmit radio communications or signals only during the first fifteen minutes of each hour, local standard time, except in case of signals or radio communications relating to vessels in distress and vessel requests for information as to course, location, or compass direction.

SEC. 26. In all circumstances, except in the case of radio communications or signals relating to vessels in distress, all radio stations, including those owned and operated by the United States, shall use the minimum amount of power necessary to carry out the communication desired.

SEC. 27. No person receiving or assisting in receiving any radio communication shall divulge or publish the contents, substance, purport, effect, or meaning thereof except through authorized channels of transmission or reception to any person other than the addressee, his agent, or attorney, or to a telephone, telegraph, cable, or radio station employed or authorized to forward such radio communication to its destination, or to proper accounting or distributing officers of the various communicating centers over which the radio communication may be passed, or to the master of a ship under whom he is serving, or in response to a subpoena issued by a court of competent jurisdiction, or on demand of other lawful authority; and no person not being authorized by the sender shall intercept any message and divulge or publish the contents, substance, purport, effect, or meaning of such intercepted message to any person; and no person not being entitled thereto shall receive or assist in receiving any radio communication and use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto; and no person having received such intercepted radio communication or having become acquainted with the contents, substance, purport, effect, or meaning of the same or any part thereof, or use the same or any information therein contained for his own benefit or for the benefit of another not entitled thereto: *Provided,* That this section shall not apply to the receiving, divulging, publishing, or utilizing the contents of any radio communication broadcasted or transmitted by amateurs or others for the use of the general public or relating to ships in distress.

SEC. 28. No person, firm, company, or corporation within the jurisdiction of the United States shall knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent signal of distress, or communication relating thereto, nor shall any broadcasting station rebroadcast the program or any part thereof of another broadcasting station without the express authority of the originating station.

SEC. 29. Nothing in this Act shall be understood or construed to give the licensing authority the power of censorship over the radio communications or signals transmitted by any radio station, and no regulation or condition shall be promulgated or fixed by the licensing authority which shall interfere with the right of free speech by means of radio communications. No person within the jurisdiction of the United States shall utter any obscene, indecent, or profane language by means of radio communications.

SEC. 30. The Secretary of the Navy is hereby authorized unless restrained by international agreement, under the terms and conditions and at rates prescribed by him, which rates shall be just and reasonable, and which upon complaint, shall be subject to review and revision by the Interstate Commerce Commission, to use all radio stations and apparatus, wherever located, owned by the United States and under the control of the Navy Department (a) for the reception and transmission of press messages offered by any newspaper published in the United States, its Territories or possessions, or published by citizens of the United States in foreign countries, or by any press association of the United States, and (b) for the reception and transmission of private commercial messages between ships, between ship and shore, between localities in Alaska and between Alaska and the continental United States: *Provided,* That the rates fixed for the reception and transmission of all such messages, other than press messages between the Pacific coast of the United States, Hawaii, Alaska, the Philippine Islands, and the Orient, and between the United States and the Virgin Islands, shall not be less than the rates charged by privately owned and operated stations for like messages and service: *Provided further,* That the right to use such stations for any of the purposes named in this section shall terminate and cease as between any countries or localities or between any locality and privately operated ships whenever privately owned and operated stations are capable of meeting the normal communication requirements between such countries or localities or between any locality and privately operated ships, and the licensing authority shall have notified the Secretary of the Navy thereof.

SEC. 31. The expression "radio communication" or "radio communications" wherever used in this Act means any intelligence, message, signal, power, pictures, or communication of any nature transferred by electrical energy from one point to another without the aid of any wire connecting the points from and at which the electrical energy is sent or received and any system by means of which such transfer of energy is effected.

SEC. 32. Any person, firm, company, or corporation failing or refusing to observe or violating any rule, regulation, restriction, or condition made or imposed by the licensing authority under the authority of this Act or of any international radio convention or treaty ratified or adhered to by the United States, in addition to any other penalties provided by law, upon conviction thereof by a court of competent jurisdiction, shall be punished by a fine of not more than $500 for each and every offense.

SEC. 33. Any person, firm, company, or corporation who shall violate any provision of this Act, or shall knowingly make any false oath or affirmation in any affidavit required or authorized by this Act, or shall knowingly swear falsely to a material matter in any hearing authorized by this Act, upon conviction thereof in any court of competent jurisdiction shall be punished by a fine of not more than $5,000 or by imprisonment for a term of not more than five years or both for each and every such offense.

SEC. 34. The trial of any offense under this Act shall be in the district in which it is committed; or if the offense is committed upon the high seas, or out of the jurisdiction of any particular State or district, the trial shall be in the district where the offender may be found or into which he shall be first brought.

SEC. 35. This Act shall not apply to the Philippine Islands or to the Canal Zone. In international radio matters the Philippine Islands and the Canal Zone shall be represented by the Secretary of State.

SEC. 36. The licensing authority is authorized to designate any officer or employee of any other department of the Government on duty in any Territory or possession of the United States other than the Philippine Islands and the Canal Zone, to render therein such services in connection with the administration of the radio laws of the United States as such authority may prescribe: *Provided,* That such designation shall be approved by the head of the department in which such person is employed.

SEC. 37. The unexpended balance of the moneys appropriated in the item for "wireless communication laws," under the caption "Bureau of Navigation" in Title III of the Act entitled "An Act making appropriations for the Departments of State and Justice and for the judiciary, and for the Departments of Commerce and Labor, for the fiscal year ending June 30, 1927, and for other purposes," approved April 29, 1926, and the appropriation for the same purposes for the fiscal year ending June 30, 1928, shall be available both for expenditures incurred in the administration of this Act and for expenditures for the purposes specified in such items. There is hereby authorized to be appropriated for each fiscal year such sums as may be necessary for the administration of this Act and for the purposes specified in such item.

SEC. 38. If any provision of this Act or the application thereof to any person, firm, company, or corporation, or to any circumstances, is held invalid, the remainder of the Act and the application of such provision to other persons, firms, companies, or corporations, or to other circumstances, shall not be affected thereby.

SEC. 39. The Act entitled "An Act to regulate radio communication," approved August 13, 1912, the joint resolution to authorize the operation of Government-owned radio stations for the general public, and for other purposes, approved June 5, 1920, as amended, and the joint resolution entitled "Joint resolution limiting the time for which licenses for radio transmission may be granted, and for other purposes," approved December 8, 1926, are hereby repealed.

Such repeal, however, shall not affect any act done or any right accrued or any suit or proceeding had or commenced in any civil cause prior to said repeal, but all liabilities under said laws shall continue and may be enforced in the same manner as if committed; and all penalties, forfeitures, or liabilities incurred prior to taking effect hereof, under any law embraced in, changed, modified, or repealed by this Act, may be prosecuted and punished in the same manner and with the same effect as if this Act had not been passed.

Nothing in this section shall be construed as authorizing any person using or operating any apparatus for the transmission of radio energy or radio communications or signals to continue such use except under and in accordance with this Act and with a license granted in accordance with the authority hereinbefore contained.

SEC. 40. This Act shall take effect and be in force upon its passage and approval, except that for and during a period of sixty days after such approval no holder of a license or an extension thereof issued by the Secretary of Commerce under said Act of August 13, 1912, shall be subject to the penalties provided herein for operating a station without the license herein required.

SEC. 41. This Act may be referred to and cited as the Radio Act of 1927.

Approved, February 23, 1927.

Source: Barnouw, Erik: "A Tower in Babel", New York, Oxford University Press, 1966.

Note to SEC. 12: There appears to be an error in the Barnouw book used as the source for this document: In the original, this section is headed "SEC. 14", and the first line, ending with "for false", appears to be the wrong beginning for this section. It is the first line of section 14. It is shown here as in Barnouw, except that it is numbered as section 12.

Documents of the Federal Radio Commission

THE DAVIS AMENDMENT

OVERVIEW OF THE CONTROVERSY

Interference plagued radio's developed all through the mid-1920s. The various bills pending in Congress before the passage of the Radio Act of 1927 contained language designed to reduce interference for the listener, particularly the listener who was located more than about 20 miles from the transmitter.

The Air Law Committee of the American Bar Association made an analysis of the provisions of the proposed legislation prior to the passage of the 1927 Act. In 1926, the Committee wrote:

..."neither the Dill bill nor the White bill deals adequately with the difficult problem of reducing interference, therby securing better reception of the better programs, and that both bills should therefore be amended 'so as to provide for closing up the superfluous stations..." (ABA Journal 12(12)(1926)).

The first requirement for equalization of service among the various geographical regions of the U.S. was included in section 9 of the Radio Act of 1927:

In considering applications for licenses and renewal of licenses, when and in so far as there is a demand for the same, the licensing authority shall make such a distribution of licenses, bands of frequencies or wave lengths, periods of time for operation, and of power among the different States and communities as to give fair, efficient and equitable radio service to each of the same (44 Stat. 1166 (1927))."

Though the FRC worked to reduce interference during that first year, reception remained difficult for many people, particularly in the South and West. As a result Congress decided to specifiy the meaning of their intent with the Davis Amendment.

The Davis Amendment, passed on March 28th, 1928, as part of the continuing authorization of the Federal Radio Commission called upon the Commission to establish equality of radio service to all of the regions of the United States. The Amendment was unpopular with members of the FRC and with engineers who felt that strict adherence to numerical parity created other more significant problems in the attempt to eliminate heterdyne interference.

THE DAVIS AMENDMENT - From the Dictionary of American Radio

FRC Documents | Oswego's Homepage | Telecom Links

Comments or Questions? email:messere@oswego.edu

Federal Radio Commission

WELCOME TO THE FEDERAL RADIO COMMISSION ARCHIVES*

SITE MAP (Subdirectory of Pages Linked To This Site)

This site was created by

Fritz Messere, Associate Professor of Broadcasting and Mass Communications at

State University of New York - Oswego

The Federal Radio Commission was created as a result of the passage of the Radio Act of 1927 (PL 632, 69th Congress, 2nd.) approved February 23, 1927 and signed by President Coolidge on February 23. The Act was created to bring order to the chaotic situation that developed as a result of the breakdown of earlier wireless acts passed during the formative years of wireless radio communication.

The Act created a five member commission with each member representing a different geographic region of the country. Members' terms overlapped and ran six years. The FRC was given licensing authority for only one year, after which licensing authority was to revert back to the Secretary of Commerce and Labor. The Commission's primary duty was to solve the interference problem which developed after the Radio Act of 1912 became unenforceable.

In the first Annual Report of the Federal Radio Commission (FRC) the commissioners wrote:

The passage of the radio act of 1927 presented a situation without parallel in the history of American executive departments. A wholly new Federal body was called into being to deal with a condition which had become almost hopelessly involved during the months following July 3, 1926, when it had become clear that the Department of Commerce had no authority under the 1912 radio law to allocate frequencies, withhold radio licenses, or regulate power or hours of transmission. The new law itself was, of course, totally untested, and the Federal Radio Commission was called upon to administer it with no clear knowledge as to the limitations which might be created by subsequent court action.

In **Stayed Tuned** broadcast historians Christopher Sterling and John Kittross note that there were several key assumptions underlying the 1927 Act. Among them were:

- Equality of transmission facilities, reception, and service as a political goal of Congress
- The 'Public' at large owned the radio spectrum but individuals could be licensed to use it
- Because the number of users seeking licenses exceeded the number of channels available some means of determining who should receive a license had to be implemented. The Congress chose criteria based on the "public interest, convenience and/or necessity."
- The broadcaster was responsible for his operation and government should not interfere unless the operator failed to met the public interest standard
- Although channels were scarce, radio as a form of expression was protected by the First Amendment and the Radio Act of 1927

These pages have been set up to help students of broadcasting, telecommunications, and public policy study the documents associated with the creation of the electronic media in the United States. The Subdirectory will allow you to link to various documents related to the licensing and authorization process that occupied the FRC's attention during its first few years.

SUBDIRECTORY OF FEDERAL RADIO COMMISSION MATERIAL

From this site you can also link to information about telecommunications, how to do research on telecommunications policy, and other subjects related to telecommunications and mass communications.

Course Information | Telecom Links | Conducting Web Research

Comments or Question e-mail messere

FRITZ'S HOME PAGE

Site last modified 8/22/97

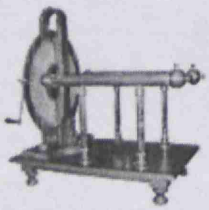
*These pages are not affiliated with, maintained, or funded by the United States government.

AMERICAN MUSEUM of RADIO

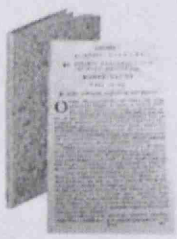
COLLECTION HIGHLIGHTS

Click HERE to Join!

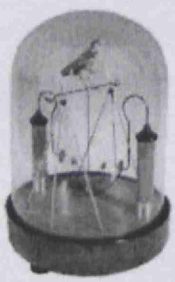
De Magnete, Magneticisque Corporibus William Gilbert 1600



Ramsden Friction Machine 18th Century



De Viribus Electricitatis in Motu Musculari Luigi Galvani 1791



Early Perpetual Motion Machine 1st Qtr 19th Century

CURATORS

We believe that discovery sparks imagination.
The American Museum of Radio is the creation of its two Curators, **Jonathan Winter** and **John Jenkins**. Acquired over 40 years by them, the objects presented by the American Museum of Radio have immense cultural, historical, aesthetic, and educational significance. Here, in their own words, they describe their collections and interests:

Jonathan Winter

It is our hope that the American Museum of Radio will fire the curiosity and imaginations of visitors, particularly youngsters, and inspire them with the desire to learn more about their world. We hope they will want to go to the library and open a book, or use the Internet as a tool to find the answers to questions they hadn't thought of before. We want them to experience the thrill of discovery, something that is in short supply in our throwaway society during this digital age.

The children of today are by and large set apart from how the objects they use actually work. They see reality through a television screen or a computer monitor, and their hands manipulate buttons on remote controls, or keyboards. They just touch a panel to turn something on. While that's convenient, it doesn't teach much about how and why things do what they do. A youngster can disassemble a cell phone without learning anything about what makes a telephone work. The child taking apart a digital watch is unlikely to learn about time, or ratios or bearings or metal, much less the mechanical power of the spring. We've lost our connection to moving parts, and we tend to forget how important they are.

At the Museum, visitors will enter a world that existed before the transistor. We want them to experience what it was like to tune in a station on a radio built in the 1920s and hear the programs as they were heard then. We want them to see how things work and begin to understand the process and the underlying scientific principles.

Visitors to the Museum will be able to see and touch and operate items that used to be very common--phonographs, radios, wire recorders, movie projectors and cameras, as well as early telephones, generators, and static electricity devices. We'll give them the opportunity to explore the analog age from beginning to end. And everyone who visits the Museum, young and old, will leave with a new comprehension and a greater sense of wonder about the science--and yes, the moving parts-of our world today.

From Jonathan Winter...

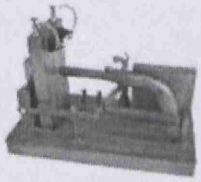
I was born in Santa Barbara, California, in 1943, when radio ruled the airwaves. Some of my earliest memories are of listening to Sergeant Preston of the Yukon, the Cisco Kid, the Lone Ranger, Amos 'n' Andy, Red Skelton, and the habituËs of Allen's Alley. I loved the voices and the stories and the many kinds of music that came out of the "magic box."

The beauty of radios--the wonderful materials, beautiful tubes, and all of the other intriguing parts--also captivated me. I can remember the seemingly endless hours I spent taking old abandoned sets apart and using the pieces to build models of spaceships and devices to communicate with distant planets. My imagination was fired up by the possibilities.

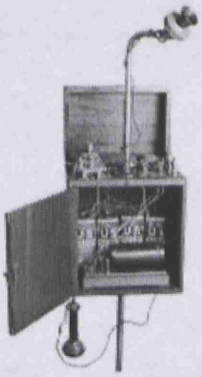
Soon I wanted to know how radios worked. Sometimes I could manipulate the wires and parts and bring a broken-down, discarded receiver back to life. These activities fed my inquiring mind, brought me wonderful words of praise from my elders, and put me in touch with a series of unforgettable mentors who liked to tinker, too. I felt empowered, and I wanted to learn more. I was hooked.

By the time I was twelve I must have had ten or fifteen old battery radios in various stages of repair. Over the years I accumulated more of them, along with parts and manuals and radio accessories. Most of this growing collection remained in storage while I went on with my life, attending several colleges and succeeding at different trades, from making fine jewelry to building satellite dishes. Always my vocations involved creating beautiful and useful things, and always I was motivated by the desire to learn more. Knowledge of what makes things work, how and why objects do what they do, continues to be important to me, and I've acquired it through several different kinds of education, much of it provided by life.

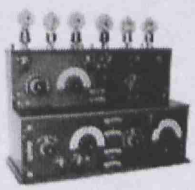
Finally I settled in Bellingham and was able to bring my collection of radios and related paraphernalia out of storage. More than 1,000 objects illustrate the history of radio from the first crystal sets to the largest and most



Early "Pistol" Coherer
(Italy)



Collins Wireless
Telephone
Inductive Model
1909



Duceret "Piano" 6 valve
1926

RCA Sarnoff Speaker
1924

sophisticated receivers of the Golden Age. I have collected static electricity machines and early phonographs, as well as many examples of radio broadcasting technology. There are rare tubes of great beauty, speakers, microphones, and thousands of books, magazines, technical manuals, Edison cylinders, 78 rpm records, and recordings of popular radio programs.

I shared this collection with others through what was first known as the Bellingham Antique Radio Museum and now has become--with the addition of John Jenkins' collection--the American Museum of Radio.

From John Jenkins...

John Jenkins

I was born in 1953 in Bellingham, Washington. I joined Hewlett-Packard as an engineer in 1974 and held various technical and sales positions there during the next twelve years. In 1986 I moved to Microsoft, where I worked for fifteen years, most recently as General Manager of worldwide OEM sales and marketing. I retired from Microsoft in February 2001.

My interest in electricity started when I was very young. My father was an industrial electrician and with two older brothers, I was "exposed" to electricity projects and experiments from the time I was in diapers. Those projects quickly switched to radio when I discovered my great-uncle's long-abandoned radio correspondence course gathering dust in the basement. Before long I was making weekly trips to the local dump to find discarded radios that I could either repair or cannibalize for parts. When I was thirteen, I built a local telephone network to connect the houses of my friends, using modified table radios as amplifiers. By that time I also had a small neighborhood radio repair business, operating it from that same dusty corner of my parents' basement.

About that time, I discovered a 1927 radio in my grandmother's basement. I got it to work and from that moment, I was hooked on antique radios and other interesting objects related to the history of electricity. During the next forty years, I collected more than 1,500 pieces that depict the scientific exploration of electricity from 1600 forward, as well as the early years of radio. There are many artifacts from the laboratories of the early pioneers of electricity, plus rare radios, speakers, and related apparatus from the beginnings of the broadcast era. Among the most exciting components of my collection are original books and scientific papers that chronicle crucial milestones in the development of radio and electricity, by authors such as Gilbert, Galileo, Benjamin Franklin, Volta, Hertz, and Marconi.

Visit John Jenkins' personal web site

The Davis Amendment and The Federal Radio Act of 1927: Evaluating External Pressures in Policymaking

In March 1927, the Federal Radio Commission (FRC) undertook the task of sorting out the interference problems and setting a regulatory agenda which would shape the nascent broadcasting business in the United States, a business that was less than seven years old. Conceived by Congress as a hurried solution to the interference problems of 1926, the Federal Radio Commission undertook the unenviable task of creating a new agency without any resources allocated to it. Additionally, the full membership of the Commission was not ratified by the Senate and it lost two of its members within the first year. It is not surprising to discover, therefore, that the work of the Commission met with dissatisfaction among members of Congress, distrust by the public, and attempts to rifle specific agendas through by large broadcasting and radio manufacturing interests.

The original legislation creating the Federal Radio Commission called for a one-year tenure for the agency, subject to reauthorization by Congress. During the reauthorization hearings, Representative Ewin Davis (R) of Tennessee charged the FRC was doing the bidding of the large broadcast interests and that the agency had failed to meet its mandate to create service for all Americans.

Davis introduced an amendment to the reauthorization bill that declared all Americans were entitled to equality of radio broadcasting service, both of transmission and reception. The amendment called for equitable allocation of licenses, wavelengths, time, and station power to each of the states according to population within each zone. The purpose of the amendment was to make the intentions of Congress clear to the members of the Federal Radio Commission.

Before and after amendment's adoption, public relations campaigns both for and against the implementation of the amendment's provisions heightened public awareness of both the Federal Radio Commission and the problems that it faced. Posturing about the difficulty involved in trying to implement the equality of service provisions led the Federal Radio Commission to become reactive to the influence of various members of Congress, to the pressures of the electronics industry, and to the needs of smaller regional broadcasters. The reactive stance helped set the mode of operation and the public posture for the Commission for the first years of its existence. The outcome of the Commission's work between the years 1927 and 1933 resulted in the creation of a local/ regional broadcasting service that relied heavily on a system of large and small broadcast stations that carried network provided, commercially oriented radio programs designed primarily for commercial entertainment.

A reading of the trials and tribulations of an upstart federal bureaucracy might make for an interesting, even nostalgic look at the birth of radio regulation, but one could question the importance of studying the adoption and

implementation of the Davis Amendment now. Broadcasting historian Susan Douglas reminds us that we can look at "old articles about radio fever as fanciful and misguided stories of little consequence, or we can take them seriously, and analyze the connections they reveal between technology and ideology."[1] As the Federal Radio Commission was being created there were powerful institutional forces seeking to influence the decisionmaking process. Their roots were political, economic, technological, and social, and the interaction between those influences produced a situation calling out for regulatory control. Congress responded with compromise legislation, written broadly, allowing independent commissioners the freedom to develop a new systematic paradigm for regulating broadcasting in the United States. However, In the *End of Liberalism*, Theodore Lowi writes that compromise legislation which marked the beginnings of many regulatory agencies often called for unclear, contradictory goals. Lowi found many regulatory statutes were void of meaningful guidelines beyond the abstract requirements to serve the 'public interest.'[2] Did the vague, compromised language that created the Federal Radio Commission make it impossible for a new structure of broadcasting to develop? Would the FRC Commissioners have the ability to separate their regulatory responsibilities from their political responsibilities? Were the technical limitations of the medium destined to define the solutions possible to the equalization clause?

Through an examination of the issues and problems that compelled the Federal Radio Commission to adopt certain policy decisions that met the legislative requirements of the Davis Amendment, I hope to illuminate some of the unintended consequences of deliberate legislative acts. The FRC began the regulation of wireless communication, and today's industry is still bound in some ways to the regulatory stances carved out during these early days. For example, the Federal Communications Commission is still bound by the regulatory procedures started by the FRC. Could a study of the initial controversies illuminate our knowledge about the commission's expectations for structuring the industry, along with the resultant outcomes for reducing interference? As a corollary, can we discover any insights regarding the industry's expectations from the commission?

Karl Popper suggests that the study of linkages between intentions and outcomes can produce insights into why the actions of historical actors who set out to accomplish one set of goals might produce unanticipated or contrary results.[3] Popper's suggestion holds promise for the study of broadcast regulation. For example, did the Commission's desire to create a quick solution to meet the rigid requirements of the Davis Amendment contribute to the notable reduction of nonprofit broadcast stations?[4] Was there a concern by the FRC or consulting engineers that the new technical plan described in General Order 40 could only be met by commercial stations able to buy expensive new equipment to meet a set of more stringent technical regulations? Such a proposition, though not definitively accepted in the current literature, is not without possibility.[5] Still, such a proposition opens a speculative, but viable set of explanations as to why commercial broadcasting emerged during the earliest days of radio and why a more public service orientation in radio did not surface until the creation of the FM band.

Surprisingly, while some scholars have focused on either the history or the workings of the Federal Radio Commission, few have focused on the significance of the external pressures on the Commission that may have prevented it from resolving the interference and technical problems in its own way and within its own time frame.[6] If we examine the interests, motivations, and behaviors in the institutional setting of the Federal Radio Commission against the interdependent interests and motivations of Congress, the large broadcast trust, and the National Association of Broadcasters, we may gain insights into the decisions and the decisionmaking process?

This paper will briefly outline the events that occurred before, during, and after the passage of the Davis amendment, look at the interaction among the various players, and identify the interests they sought to further. Finally, I will examine the decisionmaking process of the Commission in deciding how to implement the equality of service requirements of the Davis Amendment.

I. The Federal Radio Commission. The First Year

According to the first *Annual Report of the Federal Radio Commission*, "a wholly new Federal body was called into being to deal with a condition which had become almost hopelessly involved during the months following July 3, 1926."[7] Congress had failed to create proper legislative oversight earlier in 1912 when it gave supervisory responsibility to the Secretary of Commerce and Labor. This failure to provide proper regulatory oversight came back to haunt Congress a decade later when Secretary Hoover found he lacked the authority to revoke station licenses, assign power levels or times of operation.[8] Radio's growth was explosive.

Congress needed to do something fast; the question was 'what to do?' Lowi reminds us that regulation is only one of several ways governments seek to control society and individual conduct. And since there are some specific purposes that are best pursued through regulatory techniques, we should be able to observe a distinct set of political-process consequences associated with this kind of government commitment.[9] Scholars disagree as to why legislators wanted an independent commission. There may have been some reluctance to trust the Secretary of Commerce and Labor since Hoover was seen as closely aligned with large broadcast interests.[10] After consideration, perhaps Congress decided that an independent regulatory commission could best deal with the seemingly intractable interference problems that had developed as a result of the breakdown of the Radio Act of 1912.[11] Or, perhaps Congress was reluctant to adopt any of the earlier bills retaining the supervision of the Secretary of Commerce since they failed to gain partisan support in Congress. However, when Attorney General Donovan declared the existing regulation unconstitutional, the mounting interference crisis made radio reception almost impossible in many parts of the country. Amid mounting complaints from the rapidly growing broadcasting industry and local constituents who were eager to listen, legislators moved to create emergency legislation.[12]

Representative Wallace H. White (R- Maine) sponsored a bill in the sixty-ninth Congress giving authority to the Secretary of Commerce to grant licenses, assign wave lengths, and allot time to broadcasters while Clearance C. Dill (D-Washington) sponsored a bill in the Senate that created an independent five member commission to have almost total control over broadcasting. Though both bills passed in their respective houses, the conference committee was unable to reconcile the difference before adjournment of the first legislative session.[13]

Continuing public outcry about the deteriorating listening situation around the country forced legislators into action. A compromise was reached early in the new year; the Radio Act of 1927 passed and was signed into law by the President on February 23, 1927. The Act incorporated parts of both house and senate bills by creating a the five-member commission on a temporary one-year basis to assign broadcast license and bring order to the chaos of the airwaves. After the initial one-year period, licensing authority would revert back to the Secretary of Commerce, while the FRC would act as a sort of Court of Appeals for broadcasters. According to the Act, certain non-policy functions were to remain with the Commerce Department.[14]

The Radio Act of 1927 gave the Commission authority to grant or deny licenses as would best serve the public interest, assign frequencies, times of operation, and power output. Section 9 of the Act instructed the Commission to remove inequalities in geographic distribution of broadcast facilities that had developed prior to the Act. Congress succeeded in appointing three of the five commissioners, and *The Outlook*, a news magazine of the period, claims that politics played a part in preventing several of the commissioners from gaining confirmation. At the end of the legislative session the Federal Radio Commission was only partly filled and had no appropriations budget. Other government agencies assisted with personnel and space as the Commission struggled to begin the task of creating a new federal agency without resources.[15]

Documents of the early days of the Federal Radio Commission show that one of the first issues discussed was a plan for frequency allocation and a timetable for implementation. This was necessary because section one of the act automatically terminated all existing licenses.[16] Following a precedent set by Secretary of Commerce Hoover, the FRC held hearings in late March to solicit opinions from broadcasters. The focus of these discussions centered on the issues of allocation and the engineering concerns surrounding the interference problem. McChessney notes that these sessions were dominated by testimony of corporate-affiliated radio engineers.[17]

The outcomes of these discussions are reflected in the actions of the Commission and a plan they begin to implement. For example, General Order 11(amended by General Order 13) issued on May 21, 1927 terminated all licenses, required all stations to file applications concerning their current status, and made radio stations subject to the provisions of the Radio Act of 1927. Included in the minutes for the meeting of May 21 is a statement that recognizes that "no scheme of reallocation which does not at the very outset eliminate at least four hundred broadcast stations can possibly put an end to interference."[18] This early declaration by the Commission suggests

that the FRC recognized the need to clear broadcasting interference through attrition of stations, reallocation of assignments, and reauthorization of power outputs. However, the actions of the FRC during this first year illustrate a much more conservative body.[19] It may be that given the tenuous nature of the commissioners' appointments and the lack of funding, the newly formed agency did not want to rock the boat. It may be that coercive actions from Congress or industry made the Commission tread lightly, but during the first year few station licenses were revoked.

Throughout much of 1927, the FRC acted less like a regulatory body and more like a technical agency. Documents indicate the FRC moved congested stations to less congested spots (frequency assignments) on the radio dial rather than reducing the number of licenses. A series of channel assignment changes made during this period helped some; however, the overall problem of overcrowding and interference was not eliminated.[20] These early orders moved various stations from one allocation to another to alleviate interference problems among 'local listeners.' However, as the winter approached, rural areas still suffered from significant interference. General Order 19 provided for the large scale transfer of station assignments to clear all frequencies between 600 KHZ and 1000 KHZ from 'heterodynes' (sic) and other interference.[21] However, the intention of the Commission was to hold the industry in status quo while the agency sought recognition and money from Congress to execute its charge. Testifying to an oversight committee of the House, Commissioner Skyes stated,

> (W)e concluded it was our responsibility under the law to first give a fair trial and see if it were possible to let all of these stations live....(I)f we had denied 150 or 200 station licenses at that time, in my judgment and in the judgment of the commission, we would have had so many law suits and possibly temporary injunctions granted against us that practically the whole of the broadcast band would have been tied up....[22]

Analysis of FRC General Orders and Minutes during its first year indicates that the Commission attempted to resolve the various interference problems on an ad hoc basis.[23] These attempts produced mixed results in the various regions of the country. FRC rulings seemed to ignore their responsibilities under Section 9 of the Act and instead ensconced commercial broadcast interests, particularly the large chain broadcasting stations and affiliates.[24] Members of Congress charged the Commission with favoring large broadcasters from the East while discriminating against the listeners in the South and West.[25] Commissioners vigorously denied the charges but when the new Congress convened, oversight hearings and newspaper accounts of public reaction to the Federal Radio Commission indicate that it had not succeeded in fulfilling its goals.[26] A House report reflected the displeasure of its members:

> The set-up in the broadcasting field which it was believed at the time the radio act was passed could be worked out in a year's time had not been effected. We are confronted with the dilemma of continuing the commission in authority for another year during which it is hoped the situation may be improved.[27]

In hindsight, it appears that the Federal Radio Commission did not see that political problems would develop as a result of its policy of maintaining the status quo in broadcasting while trying to resolve most interference questions on a case-by-case basis. One could argue that without the legislative mandate of proper funding and a fully confirmed commission, the FRC lacked the political clout to resolve the technical problems it was created to fix; thus the commission argued that it tried to avoid legal challenges which might further prevent implementation of the Act.[28] Congress, on the other hand, recognized the dissatisfaction among its constituents very clearly and sought to rectify the situation during the Commission's reauthorization process. Led by members from the south and the west, Congress amended the FRC's reauthorization bill to correct broadcasting's geographical imbalance.

II. The Fight Over the Davis Amendment

The Seventieth Congress took no pity on its stepchild. Rosen says the two members most responsible for the creation of the FRC fiercely attacked its lack of accomplishments. Clarence Dill chided the 'cowards and dullards' for their inability to develop a plan to reduce broadcast stations while allowing themselves to succumb to the influence of the radio trust. Representative White complained that the FRC policies had complicated the situation. Both White and Dill echoed their colleagues by insisting that the only solution to the interference problem was the elimination of some broadcast stations. Led by Representative Davis, Congressmen from under-represented regions of the country protested that the FRC had failed to distribute facilities equally among the states.[29]

During an oversight hearing, Representative Davis served notice to Commissioner Sykes that he intended to change language in the Act to remove any vagueness about the Commission's responsibility.

> *Mr. Kading*: ....do you not think it would be very important to act upon the suggestion of the chairman of preparing an amendment to be introduced in Congress clarifying the matter (interpreting equally of service)?
> *Commissioner Sykes*: Personally, I would be glad, of course, if Congress would clarify it. I would not like to have to undertake to draw the amendment, though; I would have to leave that to you gentlemen.
> *Mr. Davis*: In other words, your opinion is, naturally, even from the point of view of the commission itself, it is highly important for whatever statutory provisions are enacted for your guidance to be unambiguous and about which there can be no controversy or conflict of opinion.
> *Commissioner Sykes*: I would be delighted, Judge, to see it at my rest.
> *Mr. Davis*: I want to state I am in thorough accord with that and, so far as I am concerned, will undertake to effect that result.[30]

With the introduction of the Davis Amendment to section 9 of the Act's reauthorization bill, a political debate ensued over the precise meaning of the 'equality of service clause' and whether passage of the reauthorization with its

inclusion would create a better radio service or hamstring the Commission in its work. Depending on what interests one held, the amendment was designed to either destroy broadcasting or save it. There seemed to be little middle ground. For example, Senator Dill said the language of the new bill made it unworkable and impracticable and blamed the FRC for disregarding the equitable service provisions of the 1927 law.[31]

Industry leaders lobbied heavily against the amendment provisions. David Sarnoff, Vice-President of Radio Corporation of America, stated, "(I)t is my hope that Congress will not pass a bill, the technical provisions of which, to my mind cannot be of help either to the listening public or to broadcasting stations."[32] Even members of the Federal Radio Commission got into the fray. Commissioner Caldwell stated that the "rider would wreck our present wonderful radio broadcasting structure" and claimed the amendment" is not practical and must be discarded in the search for a way to reduce the number of stations." Meanwhile the *New York Times* speculated, "(W)ill the Ides of March in 1928 go down in history as a turning point in 'radio'?"[33]

The heated debate crossed party lines making it difficult to assess relative support for the bill. Support for the bill appeared to be tied to supporting regional constituent desires for either more radio service or for maintaining the status quo. For example, Representative White, a powerful Republican from Maine aligned himself with Representative Davis, a Democrat from Tennessee. House Democrat McKeon from Oklahoma stated that if the "house failed to adopt the 'equitable distribution' provision he would offer a resolution call for an investigation of the (radio) 'trust'."[34] All of these congressmen had constituents who desired better local service. But, House Democrat Emanuel Cellar from New York said, "the amendment which the committee made to the Senate bill, to my mind, will put radio art into a straitjacket."[35] During February the FRC undertook several measures to appease southern supporters of the Davis Amendment.[36]

Outside organizations with an interest in radio also lobbied Congress against adoption of the Amendment. The *New York Times* covered the reauthorization bill extensively. At one point it described the political maneuvering in Congress as if it were describing a battle scene:

> Honors are even in the radio war being waged in Congress. Commissioner Caldwell opened the hostilities with an attack on the Watson bill. A few days later Senator Dill raided the Commissioner's position. Reinforcements in the form of Representative Davis, Tennessee, came to the Senator's aid. Just when it seemed the Commissioner might be forced to beat a strategic retreat, the National Association of Broadcasters, Inc. hurled its shock troops in the breach caused by Davis' flank attack on the Commissioner's left while Senator Dill was hammering his front. It appears radio is in politics![37]

Despite the best efforts of the NAB, the radio 'trust' and members who opposed it, the reauthorization which included the Davis Amendment's 'equitable distribution' requirements passed by a large margin on March 28, 1928.[38] The clause amended Section 2 of the Radio Act to read:

> ....that the people of all zones.... are entitled to equality of radio broadcasting service, both of transmission and of reception, and in order to provide said equality the licensing authority shall as nearly as possible make and maintain an equal allocation of broadcasting licenses, of bands of frequency or wave lengths, of periods of time for operation, and of station power, to each of said zones when and in so far as there are applications therefor: and shall make a fair and equitable allocation of licenses, wave lengths, time for operation, and station power to each of the States, The District of Columbia, the Territories and possessions of the United States within each zone, according to population.[39]

The FRC was directed to carry out the equality of service requirement "by granting or refusing licenses or renewals of licenses." As if to make it clear that the Commission should do its bidding, Congress set all the Commissioners' terms for expiration on February 23, 1929. The message from Congress seemed to be 'get it done in a year or we'll get new commissioners.'

With all of the apparent opposition to the Davis Amendment why did this version of the reauthorization bill emerge from committee and pass? Rosen suggests that it passed to appease Southerners who threatened to delay a vote on the reauthorization legislation. It may be that some members worried that a defunct FRC would mean that the United States would plunge into further broadcasting chaos without a regulatory body. Legislators did not want to face that eventuality and since the Commission's authority had already expired, this appeasement may have been the expedient political accommodation necessary to reinstate the FRC. Other members of Congress were concerned that without passage of the reauthorization, administration of radio would revert back into the hands of the Department of Commerce.[40]

III. The Davis Amendment and the Allocation Plan

With the passage of the amendment, the Commission members now faced the problem of implementing a plan they had publicly criticized. However, faced with the reality of the situation, the Commission had to formulate a plan to meet the specific requirements of the amendment. Louis Caldwell, Chief Counsel of the Federal Radio Commission, wrote, "(I)t would be hard to conceive of a more baffling problem than the one which Congress imposed upon the Federal Radio Commission by the so-called Davis Amendment."[41] Caldwell complained that before the amendment the Act allowed the Commission a certain latitude in making its license distribution among the different states; the flexibility was now gone because of the rigid requirements set forth by the new language.

Nevertheless, faced with the specific requirements of the Davis Amendment, the FRC undertook steps to devise an allocation policy that would bring station assignments into compliance with the newly amended Radio Act. There was disagreement among the Commissioners as to the precise meaning of the amendment. The majority of the commission construed it as requiring immediate reallocation of the broadcast band while Commissioner Robinson claimed the amendment required the Commission to adopt a policy to be followed in the future where equalization would be attained where ever possible. The commission also grappled with the question of whether the amendment required an equality of the number of licensed stations without regard to division of time or whether two or more stations dividing time could be balanced against one full time station in another zone.[42] Each interpretation created a problem for the FRC since each interpretation called for a different engineering calculus.

At the end of March a working group from the Institute of Radio Engineers (IRE) submitted a memorandum to the Commission describing a plan for classifying the 90 broadcast channels into three groups of licenses. The plan called for the creation of national, regional and local broadcasting services. Under this scheme licensees would be apportioned equally to all five zones.[43] The study was reported out on April 6, 1928, when the Commission asked radio engineers, under the supervision of Dr. J. H. Dellinger of the U. S. Bureau of Standards for their recommendations to implement the allocation plan.[44]

Also during this time the Federal Radio Commission began to solicit the expert opinion from members of the Institute of Radio Engineers such as L. E. Whittemore, in addition to using experts at the U. S. Bureau of Standards, Captain Guy Hill from the Army Signal Corps. and the other engineers from consultative or technical groups.[45] The obvious complications of the equalization clause required the Commission to attempt to become more sophisticated in its approach to solving the radio interference problem. But, now the Commission found itself facing increasing pressure from Congress.[46]

By April 1928, the initial plan proposed by the Institute of Radio Engineers was fleshed out. Briefly, the plan created a zone-based allotment scheme for the 90 channels available in the standard broadcast band. It called for the creation of 50 high powered stations that would operate on 'cleared channels.' Ten stations were to be assigned to each zone of the country. Because these stations were assigned the sole use of the channel (clear channel) during the nighttime, no heterodyne interference would occur and reception of these high powered stations would reach into the furthest sections of rural America. The remaining 36 channels would be divided between stations that served the regional and local needs of the various zones. Each zone would receive 10 of these secondary channels. Because these secondary stations were lower in power, engineers believed it would be possible to assign more than one station to each region of the country. [47]

The Institute of Radio Engineer's plan did not meet with widespread approval from either Congress or the broadcasting industry. There were two major problems with the plan. First, it called for a maximum of 340

stations, a reduction of nearly 350 stations from the current allocation. Secondly, new higher powered clear channel stations did not fit into the scheme envisioned by members of Congress seeking to appease their constituents. Ewin Davis, author of the equalization amendment, lamented "the tentative plan is overloaded with so-called national stations...." Later that April the National Association of Broadcasters, the Federal Radio Trades Association and the Radio Manufacturers' Association proposed a wholly different interpretation of the Davis Amendment. The NAB, fearing a reduction in the number of licenses, offered a plan that attempted to maintain the status quo of assignments as much as possible. The National Electric Manufacturers' Association and other broadcasting station groups also submitted various allocation plans to the Commission.[48] No one plan seemed to meet the specific requirements of the equal allocation clause. While the IRE's plan seemed to have the inside track because it had the support of J. H. Dellinger, the *New York Times* reported members of the National Association of Broadcasters were disenchanted with the proposal, calling it too theoretical. The NAB and NEMA also called for an investigation of the agreements made by members of the radio trust.[49]

Why was a logically designed plan, incorporating some of the best engineering theory of the day, unacceptable to those with political or industry influence? There were major obstacles to implementing the engineers' proposed solution. First, equalization would require the Commission either to target zones with more stations and reduce the number of licenses in those zones, or increase the number of licenses in the zones that were under served thereby increasing the number of stations and the interference level overall. The former plan would rile Congress by eliminating many constituent radio stations. And, while the latter plan might be a political expedient, it would not eliminate the interference problems that the FRC was created to resolve. In either case, there was also some concern that whatever plan was adopted, the plan would permanently freeze the number of broadcasting stations.

Similarly, the equalization clause required making the number of licenses allotted to the various zones proportional to the populations of the states within each zone. Thus it was possible that even though a zone may have the correct number of licenses, once the FRC decided whether to increase or decrease the number of licenses, the zones would have to redistribute those licenses among the states if their number did not reflect the correct population ratios. Further, while the engineer group's scheme began to address one of the equalization requirements of the Davis Amendment, the division of power allocations among the zones, their plan also needed to address station power and time division within the zone and among the states based on population.[50]

The FRC felt obligated to start the process of reducing the number of licenses in order to implement the new allotment scheme.[51] General Order No. 32, issued on May 25, 1928 asked for 164 broadcasting stations to show cause why they should continue to be licensed. Most of these stations were located in highly populated states in the East and Mid-West. No stations from the South were included in the Order. Over the summer a number of licenses were disposed and other stations included in this group had their hours of operation or power sharply curtailed.[52] While the engineering staff under J. H. Dellinger grappled with the difficult problems posed by the

equalization clause, the Commission provided an outwardly visible demonstration that it was dealing with the questions of allocation and division of service by eliminating small and marginal broadcasters.[53] Ready to avoid controversy for its actions, the FRC issued two lengthy documents on August 23 and September 1, 1928 describing the Commission's application of a vague public interest standard in reviewing the stations examined in General Order 32.[54]

Hugh Slotten contends that the engineers' view became dominant because key members of the commission believed that rancorous political debate would be avoided if the solution was based primarily on the use of technical reason. Engineers interpreted the "public interest" standard as one that provided the best possible service based on engineering standards and technical efficiency.[55] Since Congress failed to define the meaning of public interest, the technical definition could be construed as easily as any other definition. Supporting this thesis is the fact that some Commission members argued that equalization and reallocation were fundamentally technical problems demanding technological solutions. [56]

Slotten's thesis is enticing but not wholly supported by the engineering facts reported out in the Federal Radio Commission's Annual Reports for 1928 through 1931. For example, the broadcast section of the FRC's annual reports of 1930 and 1931 under C. B. Joilleff and V. Ford Greaves detail a much more complex matrix of engineering data than previously included under J. H. Dellinger in General Order 40. Also, the Commission abandoned the quota system that it applied in 1928. Starting with General Order No. 92 issued June 17, 1930, a 'unit system' of evaluation to determine equalization compliance was adopted that included information about type of channel, power, hours of operation, and other considerations. The unit system provided a richer data set for analysis, but it also provided some indication that true equalization would never be achieved.[57]

IV. General Order 40 - Making Lemonade out of a Lemon

On August 30, 1928 the Federal Radio Commission issued General Order 40, a plan outlining a quota system for the reallocation of broadcasting stations. Immediately the Commission began a public relations offensive to convince politicians, broadcasters, and the public alike that the scheme was the best possible solution to meet the equalization requirements specified in the Amendment.[58] On September 4, 1928, Chief Engineer J. H. Dellinger submitted a memorandum to engineers detailing the principles of the allocation plan. Three days later Dellinger issued a second engineering analysis of the plan. The second analysis, made by John V. L. Hogan a well known radio consulting engineer, supported Dellinger's engineering assertions. Hogan states, "I feel you and your Commissioners are to be congratulated upon having withstood criticism until this time when you are prepared to rearrange the broadcasters with the least possible disturbance of established services and the greatest improvement of the status of listeners, consistent with the law."[59]

Dellinger's memoranda and the supporting engineering opinions are significant for several reasons. First, they were meant to reassure those broadcasters who survived the earlier round of cuts that the status quo would be maintained as much as possible by providing a permanent, definite basis of station assignments for each zone and locality. Thus, any station that survived the license hearings of the past summer would find an allocation on the allotment table under General Order 40.[60] Secondly, Dellinger outlined a strategy for implementing 40 high powered stations on clear channels, a plan meant to bring greater listening choice to rural America while further entrenching the interests of the radio trust. Third, the plan placed several blocks of regional and local services on different parts of the dial to minimize inter-channel interference. This reallocation allowed larger metropolitan areas to have more station assignments. Finally by using the 'borrowing' clause of the Davis Amendment, some Commissioners hoped to keep licenses for stations in zones that were currently over quota by borrowing those frequencies from other states in the same zone that were under quota. This maneuver was meant to placate broadcasters and audiences in metropolitan areas who were used to having a diverse number of stations to choose from.[61]

While the plan implemented guidelines specified in the report of the Institute of Radio Engineers generally, General Order 40 specifically acknowledged the importance of meeting its political obligations as well adhering to the Commission's earlier decision that no existing stations would be abolished as a result of the new allocation. To reinforce the notion it was meeting its responsibilities as a regulatory arm of Congress, the FRC in its Second Annual Report specifically outlined the outcome of license reductions as part of its attempt to meet the requirements of the Davis Amendment. Documents of the Commission show that this strategy was developed in August before the actual announcement of General Order 40.[62]

In implementing the equalization plan, the FRC needed to meet specific regulatory requirements in the Act allowing stations an opportunity to appeal the frequency assignment change if they were displeased by their new frequency. Such a move would reduce litigation and possible court challenges to the allocation scheme. The Commission stated it would give stations an opportunity to examine the new assignments and challenge the potential changes, thus all station licenses were extended until November 11,1928. The details of the plan were sent to broadcast licensees on September 11th. In that memorandum, Acting Chairman Sykes tried to assure broadcasters that the Order was a starting point, not a final solution. "(I)t is the desire of the Commission that any broadcasting station which is dissatisfied with its assignment under the reallocation should have an opportunity to be heard and to demonstrate that public interest, convenience or necessity would be served by a better assignment," he notes.[63] In addition to proffering good will for the new plan and hoping to head off a court challenge, the Commission wanted to examine the effects of the reallocation which up to this point were only theorized on paper. A second temporary licensing period was established to allow the engineering staff time to fix unforeseen problems after the stations moved to their new frequency assignment. [64]

The Commission used several strategies to disseminate positive information about the equalization plan to the general public. For example, the October issue of *Congressional Digest* was given over entirely to a discussion of the problems of radio reallocation. On the day of the reallocation, Commissioner Orestes Caldwell issued a lengthy statement to the public stressing several previously mentioned points that: 1) engineering experts created the plan, 2) small town and remote listeners would benefit greatly, 3) dissatisfied broadcasters could challenge the assignment, and 4) some time would be required to evaluate the effects of the change.[65] At the same time, Dellinger issued a press release attempting to explain the benefits of the plan to both general and technically sophisticated readers. In the New York *Herald Tribune*, Dellinger suggested that listeners would find it helpful to make lists of the old and new dial assignments side-by-side for easy comparison while in the *Journal of the Institute for Radio Engineers* he analyzed the allocation scheme for the technically minded.[66]

Outwardly the Commission appeared pleased with the response to reallocation although almost immediately following the announcement of General Order 40, numerous complaints were filed with the Commission. Boasting about the benefits of the new allocation scheme under General Order 40, Commissioner O. H. Caldwell stated: "Congress handed us a lemon and we have proceeded to make lemonade out of it."[67] Immediately following the issuance of the Commission's reallocation scheme, broadcasting stations began to protest the plan. Many complained that the plan did not constitute an equalization as required by the Davis Amendment. The Commission had to set several hundred cases for hearing. Meanwhile political pressure mounted in Congress at the same time as various interest groups expressed displeasure with General Order 40. On November 22, 1928, a resolution passed requiring the FRC to report back to the Senate on or before December 15, 1929 detailing the number of licenses, power allocations, number of frequencies, and periods of time for operation among all five zones.[68]

V. After Equalization: Analysis of the Commission's Choices

Analysis of the implementation of General Order 40 poses several problems for broadcast historians, and legal, science or political policy analysts. Mark Gilderhaus reminds us that the historian displays a bias through the mere choice of subject matter and Carl Becker observes that since the actual past is gone, the world of historical analysis is an intangible world.[69] What the historian chooses reflects what she/he thinks is important. Yet, public interest theory, the basis upon which we provide assessment of regulatory success or failure, is predicated precisely on those fault lines, e.g. on interpretive views of the events, legislative histories, the people circumscribing the agencies, and the specific laws analyzed during specific time periods. Robert Brett Horwitz notes that within this perspective, the public interest is assessed as either a theoretical standard or as a historical fact of the regulatory agency's birth.[70]

The Federal Radio Commission's birth was a difficult one. It was the result of rancorous debate, inadequate funding, and political manipulation. The Commission was created to deal with immediate and long-term structural

problems. Thus, given the circumstances of the Commission's birth, the amazing growth of radio as a means of communication and as a social institution, and the powerful lobbying interests of the radio trust and the NAB, the implementation of the Davis Amendment provides significant material to analyze. Several different theoretical frameworks provide potential for conceptualizing the importance of the events, for analyzing their long-term significance, and for explaining the behavior of the regulating agency.[71] Public interest theory provides us with the opportunity to view the events surrounding the implementation of the Davis Amendment as one of the resolution between the conflict of the needs of private corporations and the needs of the general public. We could deduce this based on the above stated history surrounding the passage of the Davis Amendment.

While applying public interest theory would allow the reader a historical understanding of those events, the application of such an analysis fails to provide a richness of detail in defining the various influences played upon the commission. For example, the growth of the radio industry during this period seems to fail to conform to the mold of the small, individual producer as embodied in the Jeffersonian idealism of public interest theory. During this time, radio was largely controlled by large industrialized companies such as RCA, Westinghouse, AT&T and General Electric.

The application of the 'progressive' phase of public interest theory reflects the altered economic conditions created by large corporations, situations not unlike the growth of radio during the period leading up to the formation of the FRC, but the technical interference problems and the 'equalization' requirements of the Davis Amendment effectively remove this means of analysis as a viable explanation for the promulgation of regulatory policy as embodied in General Order 40. On the face of it, the specific actions of the FRC generally seem to support the large radio interests as opposed to reflecting the work of an interventionist-type commission designed to protect powerless consumers.[72] Thus, the FRC does not seem to act like the Federal Trade Commission. or other similar regulatory agencies.

In "Four Systems of Policy, Politics and Choice," Theodore J. Lowi defines a model of capture theory that details likely policy outcomes based on the influences and types of coercion applied in given circumstances. This kind of analysis is useful because it allows one to look at the behavior of the actors and apply a schema to explain the events or outcomes as a result of the application of coercion, policy directives and/ or politics upon the regulating body. Figure 1.0 describes the four potential policies (and their political effects) that could be adopted by an independent commission such as the Federal Radio Commission as a result of the various potential influences. Under such a schema, if you looked at the policy it would be possible to guage the immediate influences upon that policy or upon trying to change that policy. For instance distributive policy would be likely to influence individual conduct as opposed the the environment of conduct throughout a whole segment of an industry or industrial sector.

TYPES OF COERCION, TYPES OF POLICY, AND TYPES OF POLITICS

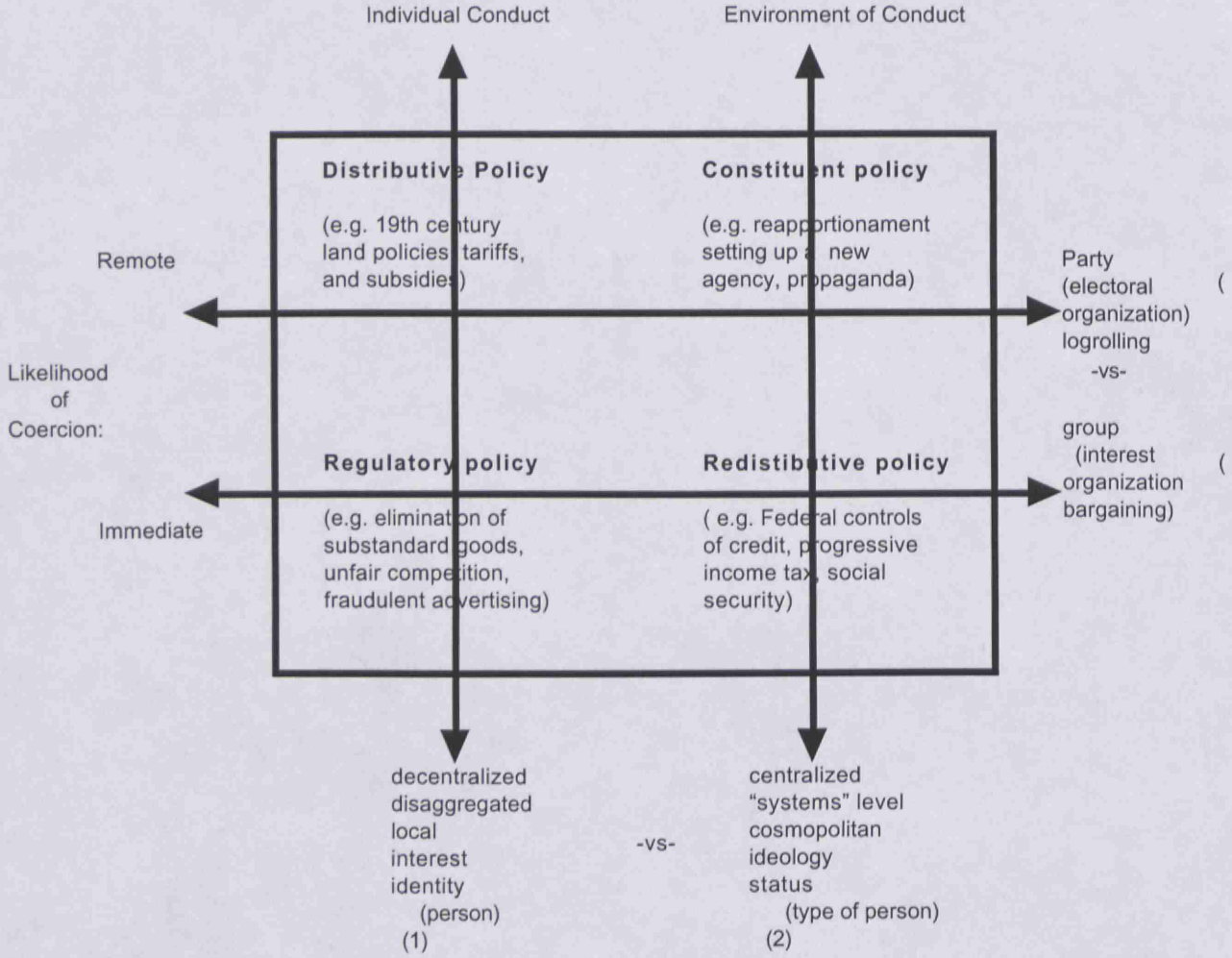


fig. 1.0[73]

To apply this schema to the Federal Radio Commission, one could analyze the nature of radio licensing and assess its potential benefit to the licensee. After doing so, it is possible to deduce the type of policies being applied to the broadcasting industry. For example, one could analyze the effects of the application of federal policy with the onset of radio licensing starting about 1912. The Wireless Act of 1912 provided for little regulatory oversight. Licensing was primarily a record keeping function assigned to the Commerce Department. As can be seen in figure 1.0, early licensing would be considered 'Distributive'. In this case government is giving away (or licensing) a property right. The determinations made for a distributive policy type generally depends on individual conduct (e.g. is the applicant a suitable license holder?). One would conclude that the likelihood of coercion upon the policymaker, the giver of the license, is as remote as the likelihood of coercion by the government upon the licensee. Since the Secretary of Commerce essentially granted radio licenses when the individual or party applied for one, we can see

that in real life little coercion would have been applied. Why? Because no test was required for licensing and the license was not a limited resource in 1912, little coercion would occur.

Using this schema to look at changes in the types of policy illustrates that the Federal Radio Commission actions do not fall into the regulatory policy arena as easily as do other governmental agencies policies such as the Federal Trade Commission or the Interstate Commerce Commission. Both the FTC and ICC were created to use 'regulatory policy' to eliminate unfair practices or reduce the problematic of poorly made or unsafe goods. Clearly the FTC could apply coercion to firms through the use of 'cease and desist orders' and 'consent degrees'. Similarly, the trust-busting ability of the FTC could move to decentralize and disaggregate large trusts.[74] Applying Lowi's schema illustrates the fact that there is a great likelihood of pressure or coercion applied to the regulatory agency when large trusts attempt to maintain the status quo.

The plight of the Radio Commission appears somewhat different from traditional regulatory agencies, though, when we attempt to plot the influences on it within this schema. The 1927 Federal Radio Commission found itself in a different situation than the Secretary of Commerce did in 1912. For example, if the FRC attempted to use 'Regulatory' policy to break up the increasingly powerful radio trust, it was likely to face the threat of immediate coercion from considerable lobby efforts of the powerful corporations involved in the radio trust. Worse yet, because the FRC was not a permanently established independent regulatory commission, it found itself heavily influenced by various 'Constituent' policy initiatives of Congress because it faced a yearly renewal. Many in Congress were looking for the FRC to reapportion frequencies favorable to them; a bit of redistributive policy with a constituent interest bent. Conversely other members of Congress from the East and Midwest looked to maintaining the status quo. Still others looked for the agency to develop policies that would permit local stations to transmit without the interference problems that plagued radio after 1926. There appeared to be no clear cut constituent decision that would please the majority of Congress possible for the Commission to adopt. And, educational leaders were interested in having the FRC develop redistributive policies that would create the necessary conditions for the long-term growth of radio for educational and informational purposes. Other special interest groups wanted to affect policy, too. Commercial interests wanted to maintain the current system of broadcasting ensuring the growth of powerful radio networks.

The divergent set of interests provided too many countervailing pressures on the infant, unstable Federal Radio Commission. As noted earlier, it was necessary for the Commission to respond to party pressures and interest group pressures of various Congressional constituents, mindful that Congress had (1) failed to confirm several commissioners who were friendly to Hoover, (2) failed to provide funds for the agency's operation, and (3) anticipated that the commission would expire at the end of its term of appointment. A look at figure 1.1 illustrates some potential policy outcomes that might occur as a result of choosing specific goals or favoring the influences of certain politics.

TYPES OF COERCION, TYPES OF POLICY, AND TYPES OF POLITICS

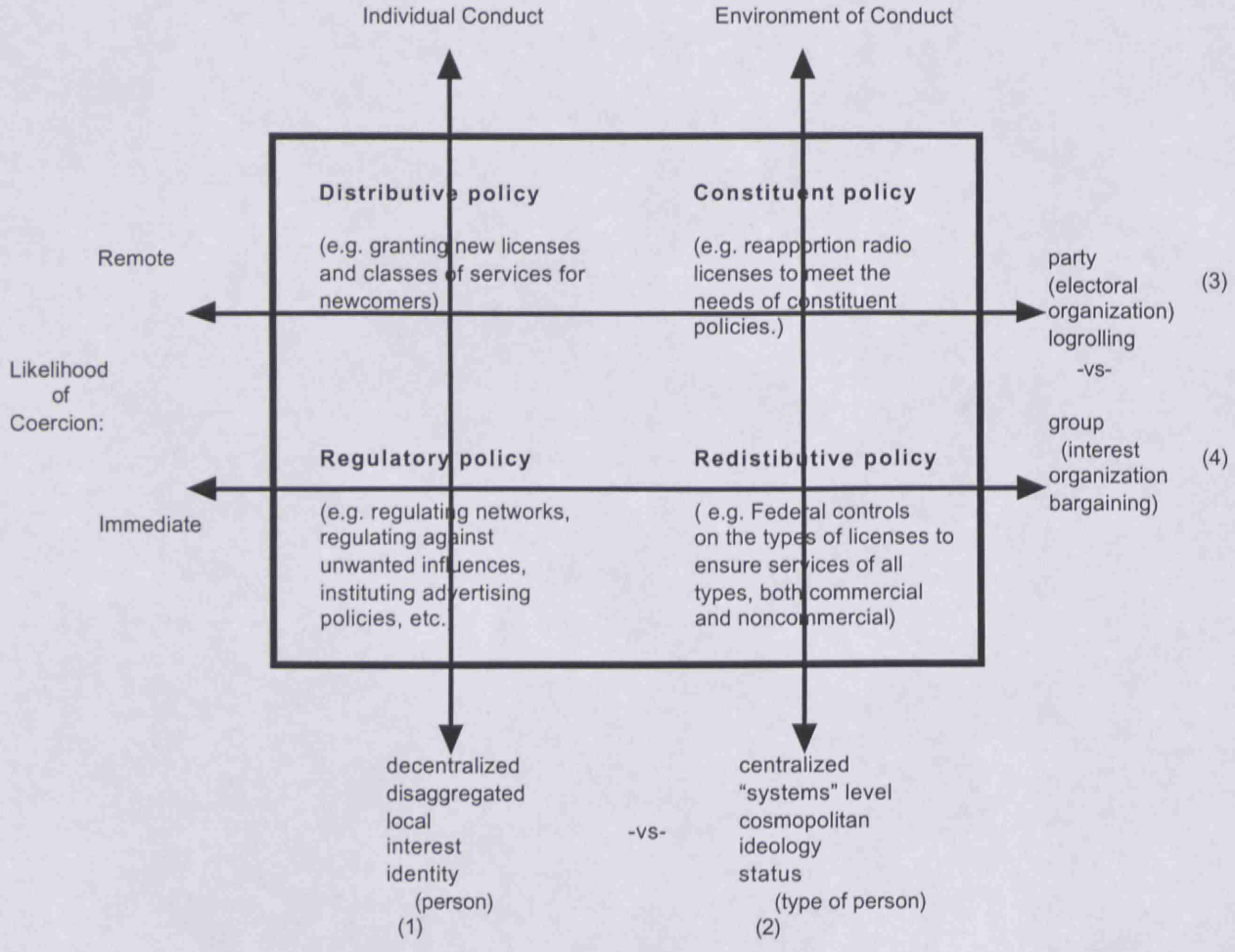


fig. 1.1

Within the framework of this redrawn policy schema one can conclude that the Federal Radio Commission of 1927 is caught between several different factions. The traditional congressional needs versus special interests needs are obvious. On one hand some congressional members, such as Ewin Davis from the South, are applying constituent coercion on the commissioners and would like to see the Commission equalize the number of radio licenses between the northern U. S. cities and southern cities. The pressures put on the Commission by the congressional membership follows traditional logrolling behavior. Adoption of the Davis Amendment's equalization language requires the FRC to act to meet the regional needs of the South and the West. Other congressmen, such as Congressman Dill, wanted the Commission to redistribute the radio spectrum for special interests such as alternative and educational users. One can see that different interests groups apply various forms of lobbying pressure would try to force the Commission to move in a specific direction on this chart. In choosing a political

solution, the Federal Radio Commission would be forced to favor one interest group at the expense of another regardless of the decision it chooses.

The FRC was faced with potential influences outside of Congress as well. The radio trust and some members of the NAB were at odds over potential regulatory policies for radio broadcasting. RCA, for example, was anxious to contain the application of FRC policy that could hamper the sales of radio receivers since it held the patents on the devices or circuits needed to build radios. Licensing fees as a means of paying for programs, such as those imposed by Great Britain, were seen as a deterrent to the sale of radio receivers. And by 1927, the members of the radio trust held the most powerful radio stations, developed chain broadcasting, and had the engineering expertise to improve these stations quickly and dramatically.[75] RCA opposed policies which disfavored large stations and its radio network. Obversely smaller broadcasters were afraid the of the potential and power of the RCA trust. These smaller National Association of Broadcasters members needed substantial revenues from advertising sales to build and expand their program offerings and broadcast facilities. These different factions attempted to coerce the FRC into adopting favorable policies to local or affiliated stations. While RCA would have favored a regulatory commission to ensure high engineering standards and the elimination of smaller nuisance stations, smaller NAB members would have favored a redistributive policy which required the delivery of programming at the local level.

The FRC tried to avoid upsetting the large station interests of the broadcasters and also tried to please the party or regional constituents' interests of Congress at the same time.[76] This strategy can be seen in the allocation scheme devised for General Order 40. The best channels favored large broadcast interests through the creation of 'clear channel' station allotments while the less powerful regional and local channel allotments could mollify many listeners concerned about their favorite local affiliated stations.[77] Given those countervailing forces, the strategy for implementing General Order 32 can be seen clearly. General Order 32 essentially reduced or eliminated marginal stations, including educational and special interest or 'propaganda' stations as the FRC referred to them. As a result of the FRC's general policies and the implementation of General Order 32, these stations found their power levels slashed and their hours of operation sharply curtailed. Clearly the actions of the commission are traced along the regulatory and redistributive trajectory; by reducing the influences of special interest groups such as educators and religious groups, the commission eliminated some of the complexity and pressure of resolving the equalization problem that faced them.

Lowi's taxonomy provides a useful way for using the historical record to assess the normative and empirical implications of radio regulation. This analysis contradicts the notion that implementation of the Davis Amendment would be best served using the very best engineering principles available. Looking at the outcomes, the implementation of the equalization principles becomes an amalgamation of both constituent and redistributive policies. For example, the intention to provide equalization of services to all regions of the country cuts across constituent boundaries, as previously noted in section 3 of this paper. However, Davis' criticism of the radio

commission for failing to reallocate power and frequency assignments of the large radio monopolies suggests the FRC should respond to Congress' desire to apply constituent policies while Dill's criticism that the FRC had not acted boldly enough suggests redistributive policies. Similarly Congress' refusal to confirm Commissioners Caldwell and Bellows suggests that members of Congress were uneasy with the close relationship between those two nominees and the powerful radio industry that was closely aligned with Herbert Hoover. These policy assumptions indicate normative policy goals Congress would have considered in voting the legislation for equalization up or down. However, along with normative assumptions were there Congressional concerns about formative outcomes, too? Did members of Congress assume that the likelihood of coercion on these Commissioners would be so great that they would do the bidding of the radio trust? Such a fear demonstrates one of the classic problems associated with the public interest capture theory.

In capture theory any institution with sufficient political influence will attempt to manipulate the policies of the agency. This may be too simplistic an explanation to understand the decisionmaking processes of the FRC. Any specific policy the FRC developed to help only one segment of the industry, say the large radio trusts, would meet the disapproval of those Congressmen who supported a different constituency, such as small, local stations. Again, Lowi's model provides illustrations of how external influences can be drawn along policy lines. The Federal Radio Commission was being pulled along ***several*** paths simultaneously. At the end of the first year, the influences upon the commission did not diminish. With the addition of specific equalization requirements in the Davis Amendment, the task that lay before the Commission was more complex politically and technically than ever. The Federal Radio Commission needed to develop an initiative that would free it from the constraints of developing a strategy for meeting the needs of just one of the four traditional sets of influences that are illustrated in figure 1.1. Instead, the Commission decided to focus on a technological solution to the administrative dilemma of having too many political interests clamoring for different policy solutions.

VI. General Order 40: Mixing Technology With Politics

Capture theory can be applied to scientific assessments as well as political influence peddling. Sheila Jasanoff states that bias in scientific assessment is commonly the result of conscious deception by 'experts' or of uncritical acceptance of the industry's viewpoint by agency officials.[78] Whatever regulations the Federal Radio Commission decided to effect regarding the interference problem, it was faced with the reality that broadcasting had established an important place in the social consciousness of America. McMahon notes that by the time Congress established the Commission in 1927, advertising had become the dominant mode of financing despite listener preferences for alternative ways to support radio programming.[79] Clearly the broadcasting networks had programming that the public wanted to listen to, and two members of the Commission had industry ties. But, it is the recommendations of the Institute of Radio Engineers that essentially assured the continuance of the large broadcasters by setting up the allocation scheme of several large, powerful clear channel stations in each zone of the country. In many cases

these large stations were already owned or affiliated with the broadcasting networks, either NBC or the newly formed Columbia Broadcasting System.

The decisionmaking process, at first blush, was seemingly based on engineering principles, but it appears to be influenced by political and economic decisions, as well as engineering requirements. For example, during the first years of the FRC, Alfred Goldsmith was both president of the Institute of Radio Engineers and the chief broadcast engineer of RCA. Thus, the recommendations of the radio engineers presented to the Commission must have reflected, at least to some degree, the beliefs of how to best deal with the interference problem from the perspective of the special committee and RCA's chief engineer.[80] Other members of the IRE committee set up to study the implementation of the Davis Amendment included C. W. Horn of Westinghouse Electric, R. H. Marriot of International News Corp., and L. E. Whittemore of the Bureau of Standards.

Several members of the Commission spoke against the acceptance of the recommendations of the engineers. On August 17, 1928, Louis Caldwell, General Counsel, notes in a memorandum to the Commissioners,[81]

> 3 a. The small stations are <u>not</u> being treated well under the proposed reallocation: it is foolish to think that they will be fooled into believing the contrary....
>
> 5. One manifest injustice in the proposed reallocation is the fact that on the whole all the so-called trust stations receive the very best treatment (in some cases the same corporation preserves two or three full-time assignments on the best channels) while the big independent stations in the Middle West are forced to divide time.
>
> 7. As a matter of fact, even the proposed reallocation does not come anywhere near complying with the Davis Amendment, under the heading of equality in number of stations.

Also taking issue with the engineers' report, Commissioner Sam Pickard, of Zone 4, wrote, "I feel it is unfortunate that my views on that subject (using the borrowing clause under equalization) are not shared by a majority of the Commission.... My apprehension is that the present effort to approach the ideal.... abruptly limits the facilities of this zone to a margin where stations, previously recognized as rendering worth while service by this Commission, cannot exist. "[82]

Representative Ewin Davis, author of the amendment, also took exception to the engineers' allocation scheme writing, "....even from the standpoint of getting the National Broadcasting Company chain programs to the various sections of the country, there is no occasion for granting to such stations a monopoly of power or desirable and cleared channels, not to speak of the fact that such an allocation would deprive stations broadcasting independent programs of the share to which they are entitled..."[83]

Even after adoption of the allocation scheme various influential people spoke out about the adoption of a commercially based systems as mapped out by the IRE and adopted by the Commission. Speaking to the American Academy of Air Law in April, 1931, Bethuel Webster, Jr. former General Counsel to the Federal Radio Commission stated[84]:

> One may praise many of the performances of the National Broadcasting, the Columbia Broadcasting System, and originated by some of the chain and a few of the unaffiliated stations, and at the same time deprecate legislative policy and administrative weakness that permit the use of the ether under federal franchise for self-advertising stunts, for the sale of quack medicine, and the exposition of religious or social creeds in which the public generally has no interest.

Whether or not the recommendations of the Institute of Radio Engineers represented the very best solution to the equalization clause conundrum embodied in the Davis Amendment is open to interpretation. Many debated the implementation and the outcomes until the Commission finally abandoned enforcement of the Amendment in 1932. The final outcome, an allotment scheme that provided radio stations of varying powers to serve the United States worked substantially well until after the heyday of AM radio. What is at issue is whether the Federal Radio Commission exercised due diligence in accepting the policy recommendations of a body that was biased in favor of the industry that created it. One could argue that the FRC did not have the ability to proceed in such a technical task since it did not establish its own engineering department until after the recommendations of the Institute of Radio Engineers on August 17, 1928.[85] But that criticism would not reflect the reality that John Dellinger, who was chief engineer at the Bureau of Standards, oversaw the Commission's technical needs during the interim period and ultimately became the chief engineer for the Commission. While Dellinger's title changed, his work responsibilities did not.

Perhaps of greater importance are the questions that revolve around the way the Commission solicited and accepted scientific advice. Members of the scientific community use a variety of boundary-defining strategies to establish their authority and enhance their stature within scientific area and their professional circle. This behavior can be traced in the relatively new, rapidly expanding field of electrical engineering. Engineers of the Institute of Radio Engineers did this by building professional communities, defining and excluding nonmembers, competing for and asserting primacy of knowledge, and asserting their authority against those who held divergent opinions. For example, between 1915 and 1920 the Institute of Radio Engineers Board, under its secretary David Sarnoff, attempted to influence policymakers to keep radio in the hands of private capital. That effort continued as RCA's chief engineer Alfred Goldsmith succeeded Sarnoff as secretary and then as president of the IRE. McMahon states that IRE's pronouncements confidently stated that "government interference always impedes technological creativity. The Board's assertions left no room for exceptions."[86] Thus the IRE's policy pronouncements from 1915 through 1930 seemed to reinforce the agenda for corporate entities that ultimately became part of the RCA 'radio trust.'

During the 1930's historian Charles Beard notes[87]:

> Few indeed are the duties of government in this age which can be discharged with the mere equipment of historic morals and commonsense. Whenever, with respect to any significant matter, Congress legislates, the Court interprets, and the President executes, they must have something more than good intentions; they must command technical competence.

In this case, the building of a national broadcasting system really required significant regulation before the technical knowledge existed on how to best build it and how best to regulate it. Perhaps McMahon provides the best overview of the significance of the Institute of Radio Engineers' role in the technical decisionmaking process when he concludes that in addition to participating in the invention and development of radio, engineers made it feasible for corporate leaders to achieve vast organizational and physical systems. They shaped both the bureaucratic context in which they worked and, in part, the social uses of the technology they helped create.[88]

Does the analysis of the political and technological implications of the Davis Amendment hold significance and meaning for regulators and policymakers of today, particularly in areas where technology is rapidly changing the environment to be regulated? In *The Fifth Branch,* Jasanoff says the notion that the scientific component of decisionmaking can be separated from the political and entrusted to independent experts has been discredited. To prove useful, those making regulatory decisions need to be informed by an accurate knowledge of the internal dynamics of both science and regulation. She cautions that however rhetorically appealing it may be, no simple formula exists to allow for injecting expert opinion into public policy debate.[89] This caution should be inscribed for future communication policymakers to remember. Today, the pace of innovation of technology again calls to question the ability of regulators to make adequate decisions about which technologies hold promise for consumers and at what cost, what effects the implementation of new technology might be, and what impact these choices will have on current broadcast and telecommunications institutions.

Regulation restricts users' choice of activities and outcomes through the institutional consolidation of legislative, executive and judicial power in the single apparatus of independent commission. The mode of action can be informal through the companion use of consultative bodies, the adjudication is flexible on a case-by-case basis, and the rulemaking procedures can be formal defining the way participation in a proceeding will occur. Given the ability of the institution to set rules, the complex interaction of influences on the regulatory process and the flexible authority of the independent commission, scholars and consumers alike would be well advised to understand the contingent and socially constructed character of regulatory decisionmaking.

[1] Douglas, Susan J., Inventing American Broadcasting 1899-1922. Baltimore, MD: Johns Hopkins University Press. 1987. pp. xix.

[2] See Lowi, Theodore, *The End of Liberalism* (2nd. ed.). New York, NY: Norton. 1979. Also see Horwitz, Robert Britt, *The Irony of Regulatory Reform: The Deregulation of American Telecommunications,* New York, NY: Oxford University Press. 1989. pp. 31.

[3] Popper, Karl, "Prediction and Prophecy in the Social Sciences" in Patrick Gardiner (ed.) *Theories of History* . New York: The Free Press, 1959. pp. 276-85.

[4] McChesney, Robert W., *Telecommunications, Mass Media and Democracy: The Battle for the Control of U. S. Broadcasting, 1928-1935*, Oxford: Oxford University Press, 1993. pp. 18-21.

[5] See Sterling, Christopher H. and John M. Kittross, *Stay Tuned: A Concise History of American Broadcasting.* Belmont, Ca: Wadsworth Publishing Co. 1990. pp. 111.

[6] For example, Rosen looks at the beginning of radio broadcasting and its relationship to government over an expansive time period, covering the Federal Radio Commission's implementation of the Davis Amendment as a small part of the total work. Rosen, Philip T., *The Modern Stentors: Radio Broadcasting and the Federal Government, 1920-1934.*, Westport, Conn.: Greenwood Press, 1980. Louise Benjamin's wonderfully documented manuscript *Ariel's Covenant* (forthcoming) describes how the newly formed commission began and organized itself, and *Congressional Digest's* October 1928 edition takes on the Davis Amendment controversy by describing the problems involved in implementing the specific requirements of the amendment. *Congressional Digest*, Vol. 7. No. 10. October, 1928. pp. 255-286.

[7] Federal Radio Commission, *Annual Reports Number 1-7, 1927-1933*, Reprinted in *History of Broadcasting: Radio and Television*, Christopher Sterling, ed. Arno Press and the New York Times: New York, 1971. pp. 1

[8] See United States v. Zenith Radio Corporation, 12 Fed. (2nd series) 614.

[9] Lowi, Theodore J. "Four Systems of Policy, Politics, and Choice." *Public Administration Review*, Summer 1972. 299.

[10] Merrit, Dixon, "To Unscramble the Air." *The Outlook*, January 19, 1927. vol. 145. no. 3. pp. 75-76.

[11] It appears that Congress understood the problems involved in this area. See Committee on Interstate Commerce, Sixty-ninth Congress, Report 772, May 6, 1926. "If the channels of radio transmission were unlimited in number, the importance of the regulatory body would be greatly lessened, but these channels are limited and restricted in number and the decision as to who shall be permitted to use them and on what terms and for what periods of time...."

[12] McChesney supra note 4, at 16., On December 7, 1926 President Coolidge said, " .... the whole service of this most important public function has drifted into such chaos as seems likely, if not remedied, to destroy its (radio's) great value. I urgently recommend that this legislation should be speedily enacted." *Congressional Digest*, supra note 6, at 257.

[13] Public Act No. 632, 69th Congress, 2d session. entitled "An act for the regulation of radio communications". Evidently both of the original bills appeared to be flawed in granting the regulatory party sufficient control or power over the licensee. The ABA noted that neither "....deals adequately with the difficult problem of reducing interference" and that both bills ought to be amended 'so as to provide for closing up superfluous stations and for paying just compensation to them'." Air Law Committee, "Interim Report on Radio Legislation," *American Bar Association Journal*, Vol. 12. No 12. December, 1926. pp. 848. Merritt, Dixon, supra note 10. pp. 75-76.

[14] Public Act No. 632, 69th Congress, 2d session. The law created a five member panel appointed to overlapping six years terms. Each commissioner was to be responsible for a geographical 'zone' encompassing a large section of the country. However, the original authorization bill expired one year after passage. The Congress needed to reauthorize the Commission in 1928. In 1929, Congress extended the Commission indefinitely. See *Congressional Digest*, supra note 6, at 265.

[15] The commissioners included Rear Admiral W. H. G. Bullard for the second zone, Judge Eugene O. Sykes for the third zone, and Orestes H. Caldwell for the first zone. Neither Henry A. Bellows of Minneapolis for the fourth zone nor John F. Dillion for the fifth zone was not confirmed by Congress. Though Caldwell actively sought appointment, he was not confirmed by the 69th Congress. (*The Outlook* says that the objection to both Caldwell and Bellows, according to Dill, was they were seen to be under the influence of Hoover. See *The Outlook*, March 23, 1927. vol. 145. no. 12. pp. 356.) According to Barnouw, Caldwell decided to start work under his interim appointment, without salary, hoping to be confirmed in the next session of Congress. Barnouw, Erik, *A Tower in Babel: A History of Broadcasting in the United States, Volume 1 to 1933*, New York: Oxford University Press, 1966. pp. 213. Several other governmental agencies lent support to the orphaned commission. Loaned from the Department of Agriculture, Sam Pickard became the Commission's secretary. The Navy loaned the commission the services of Captain Stanford Hooper while the Department of Commerce lend the services of John H. Dellinger, chief of the Commerce's Radio Division. Benjamin, supra note 6, at Ch.. 6, pp. 2.

[16] Minutes of Discussion of the Federal Radio Commission, April 29,1927, NARG -173, Box 128, DOA - Executive Director, General Correspondence.
[17] McChessney, supra note 4, at 19.
[18] *General Order 11* issued at a meeting of the Federal Radio Commission, May 21, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. While it does not call for the elimination of any stations, the FRC clearly states that it believes that eliminate of interference can only be accomplished by reducing the number of broadcasting stations by 40%. The document also draws special attention to the fact that there are no unallocated frequencies from which to draw upon. Hence, the Commission indicates that it will be reassigning many stations to different frequencies.

[19] Schmeckebier, Laurence F., *The Federal Radio Commission: Its History, Activities and Organization*, Service Monographs of the United States Government No. 65, The Brookings Institution: Washington, 1932. pp. 23.
[20] Federal Radio Commission, supra note 7 at 9. See the *Annual Report of the Federal Radio Commission.*
[21] See Minutes of the meeting of the Federal Radio Commission, June 7, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. General Order 19 issued by the Federal Radio Commission, November 14, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence. Special Order 211 issued by the Federal Radio Commission effected the reassignment of many stations to help with the interference problem in rural areas. See Federal Radio Commission, Special Order 211, November 16, 1927, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[22] United States Congress, House of Representatives, Committee on the Merchant Marine and Fisheries, *Hearings on the Federal Radio Commission* , 70th Congress 1st session. January 26, 1928. pp. 3.
[23] This statement is not meant to suggest that the FRC had no plan or organizational conception of what it wanted to accomplish. For example, one of its first actions was to place all stations on even ten kilocycle spacing. Similarly, during the summer of 1927 the FRC separated stations in the same locality by at least five channels. Both of these techniques required some overarching plan. However, most problems were examined on a case-by-case basis. See "How the Federal Radio Commission Brought Order Out of Chaos" by Caldwell, Orestes, *Congressional Digest* supra note 6, pp. 266.
[24] See General Orders 10,11,12; Special Orders 5,6,7,8,9, Special Order 211. Federal Radio Commission supra note 5, NARG-173, Box 128, DOA-Executive Director , General Correspondence. See also Herring, J. M. "Equalization of Broadcasting Facilities Within the United States," *Harvard Business Review,* Vol. 9. no. 4, 1930. pp., 417- 430.
[25] "Urges Fixing Power of the Radio Board," *New York Times*, January 31, 1928. pp. 18.
[26] Rosen, Philip T. supra note 4. pp. 129. See also Schmeckebier, Laurence F. supra note 19. pp. 25. *Time Magazine* wrote that the large broadcast interests would be displeased with the actions of Congress during the reauthorization of the FRC because "(T)he effect may be to cut the franchises of the rich, long-established stations in New and Chicago zones to benefit the Southern and lower-Midwestern stations." "Radio: Opportunity for Service," *Time Magazine*, Vol. XI. no. 15, April 9, 1928. pp. ??????
[27] United States Congress, House of Representatives, Committee on the Merchant Marine and Fisheries, *Report on the Federal Radio Commission to accompany S. 2317., Report No. 800,* 70th Congress 1st session. February 29, 1928. pp. 2.
[28] Barnouw, supra note 15. pp. 215.
[29] Rosen, Philip T. supra note 6. pp. 129.
[30] United States Congress supra note 22. pp. 31.
[31] "Senate Demands Radio Bill Parley," *New York Times*, March 14, 1928. pp. 6-7. (??)
[32] "Radio Men to Fight Bill In Washington," *New York Times*, March 7, 1928. pp. 30.
[33] "Radio War Rages Around "Equal Division' Amendment." *New York Times,* March 4, 1928. pp. 19.; "Ides of March Loom as Day Approaches" *New York Times,* March 11, 1928. pp. 15.
[34] "Battle in Congress Opens on Radio Bill" *New York Times*, March 2, 1928, pp. 22.
[35] "Will the Davis Amendment Bring Better Radio?" *Congressional Digest* supra note 6. pp. 268.
[36] Minutes of the meeting of the Federal Radio Commission, February 17, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence. pp. 341, 343.
[37] *New York Times*, supra note 33. pp. 19. It should be noted that the *New York Times* was probably not an impartial observer. Since its main readership was New York City, the Times reflected the indignation that the city might lose some radio stations during a reallocation of the Davis Amendment. See "Radio Men Unmoved by Davis Measure," *New York Times,* March 3, 1928. pp. 10.
[38] After a prolonged debate the bill passed 235 to 135. The vote was split along geographical lines with the majority of the opposition from the heavily populated states of the East and Midwest. See Schmeckebier, Laurence F. supra note 19. pp. 28.

[39] 45 Stat. L., 373. section 9.
[40] Rosen, supra note 6. pp. 130.
[41] *Congressional Digest*, supra note 6. pp. 262.
[42] Federal Radio Commission, supra note 7. pp. 12.
[43] id
[44] "Report of Radio Engineers to the Federal Radio Commission," *Journal of the Institute of Electrical Engineers,* Vol. 17 ???? pp. 556. See also Press Release of the Federal Radio Commission (hereinafter Press Release), April 11, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence. By contrast, when the FRC came into being in 1927, it used the same techniques that the Secretary of Commerce had used in the National Radio Conference of the 1920s. Then the Commission asks broadcasters for input to a possible solution to the interference problem. See Federal Radio Commission, supra note 7. at 3. Most of the input reflected commercial interests. See also McChesney, supra note 4. at 19.
[45] See Minutes of the meeting of the Federal Radio Commission, April 11, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[46] At one oversight hearing, Chairman Ira Robinson complained of 'political pressure constantly exercised...in all manner of cases' by members of Congress. See Schmeckebier, Laurence F. supra note 10 at 57. This pressure, coupled with Congress' passage of the one-year term clause in the 1928 reauthorization certainly illustrated the coercive potential of the legislature on the independent body. See Barnouw, Erik supra note 15 at pp. 217.
[47] Press Release, supra 41.
[48] Federal Radio Commission, supra note 7. Appendix 'E' pp. 142- 150. J. H. Dellinger attempted to discredit the plan submitted by the National Association of Broadcasters because it strayed too far from engineering considerations. In writing an analysis of the broadcasters' plan Dellinger wrote, "Several speakers at the hearing emphasized that engineering considerations are not the only ones involved, and that other matters, financial problems, local conditions, etc. make some of the engineering recommendations impracticable. While it is true that the problem of broadcast allocation is too complex to be solved by straight engineering calculation, nevertheless its solution can not be right if it disregards any valid engineering principle."
[49] *New York Times*, "Radio Allies Offer Allocation Plan," April 23, 1928. pp. 18.
[50] Federal Radio Commission supra note 7. Appendix "E", "Summary of the conference of engineers on April 6, 1928, by J. H. Dellinger" at 133. Dellinger states " (S)ince the law requires equality of the number of hours and licenses among the zones, and, according to population, among the States within each zone, if time is divided on a given channel among several stations in any one State, this division must be duplicated on some channel in every other zone and proportionally in every State."
[51] Increasing the number of stations as a political expedient would have required the FRC to rescinding General Orders 92 and 102 which set forth the method by which equalization would be brought about. General Order 102 prohibited the FRC from allocating more stations to zones that already used its pro-rated share of facilities.
[52] Federal Radio Commission supra note 7 at 150.
[53] While Commissioner La Fount moved for the adoption of the basic principles of the Engineer's Plan on July 24, this was really a formality since the Commission had been working on the basic plan since April. Lafount, Harold A., Memorandum, July 24, 1928" NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[54] Federal Radio Commission supra note 7 at 163.
[55] Slotten, Hugh Richard, "Creating "Radio Paradise": Radio Engineers, the Federal Radio Commission, and Technological Systems"(Unpublished manuscript). p. 21-22.
[56] During this period and through the fall, Commission members sought public support for the engineers' report. For example, on a tour of Western states, Fifth Zone Commissioner Harold LaFount supported the clear channel concept by stating: "We hear a lot about freakish characteristics of radio, but we know enough about it to realize that one station on a channel produces the desired results." See "West unworried over new waves," *New York Times*, May 6, 1928. xx. pp. 21.
[57] Herring, J. M., "Equalization of Broadcasting Facilities Within the United States," *Harvard Business Review*, vol. 9, No. 4. 1930. 423.
[58] Four Commissions supported the plan. Ira Robinson, as noted earlier, voted against the Order believing that the Davis Amendment did not require immediate action.

[59] "Radio Engineer Analyzes New Broadcasting-Allocation Plan," NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[60] Memorandum to Broadcasting Committee, NARG-173, Box 128, DOA-Executive Director, General Correspondence. General Order 40 issued August 30, 1928 by the Federal Radio Commission, August 30, 1928, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[61] Memorandum 180 "To All Persons Holding Licenses to Broadcast" Federal Radio Commission, September 11, 1928. NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[62] Memorandum to Eugene O. Sykes from G. Franklin Wisner, NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[63] Id.
[64] Caldwell, O. H. "How the Federal Radio Commission Brought Order Out of Chaos" from *Congressional Digest* supra note 6 at 266.
[65]Orestes H. Caldwell, "Why the broadcasting reallocation was made," NARG-173, Box 128, DOA-Executive Director, General Correspondence.
[66] Dellinger, J. H., "The New Dial Settings:" NARG-173, Box 128, DOA-Executive Director, General Correspondence. Dellinger, J. H. "Analysis of Broadcasting Station Allocation," *Journal of the Institute of Radio Engineers*. Vol. 16. no. 11. Nov., 1928. pp. 1477-1485.
[67] Caldwell, Louis G. "The Standard of Public Interest, Convenience or necessity as used in the Radio Act of 1927," *Air Law Review*, Vol. 2, No. 3. July, 1930. pp. 326.
[68] Herring, J. M. supra note 22 at 422.
[69] Gilderhaus, Mark T. *History and Historians: A Historical Introduction, 2nd ed.*, Englewood Cliffs, N.J.: Prentice Hall, 1995. pp. 80.
[70] Horwitz, Robert Brett, *The Irony of Regulatory Reform: The Deregulation of American Telecommunications.* New York, NY: Oxford University Press, 1989. pp. 27.
[71] Id. pp. 22. Horwitz provides an outstanding discussion of the different theories of regulation and their specific weaknesses and strengths.
[72] Id. pp. 121.
[73] See Lowi, Theodore J. supra note 9 for a complete discussion of this schema.
[74] Jome, Hiram L., *Economics of the Radio Industry*, Chicago: A. W. Shaw & Co., reprinted by the Arno Press, New York, 1971. pp. 53. The formation of the radio trust and the creation of RCA occurred largely because of government intervention so as to making the licensing of technology easier.
[75] McMahon, A. Michal, *The Making of a Profession: A Century of Electrical Engineering in America*, New York: Institute of Electrical and Electronics Engineers Press. 1984. pp. 163. See also Jome, supra note 74. pp. 251.
[76] During the spring of 1928, the FRC quickly approved power increases and frequency changes for stations in the southern zone but withheld changes in allocation or allotment for stations in the East and Midwest. See NARG-173, Box 128, DOA-Executive Director, General Correspondence. FRC minutes April 11, 1928.
[77] See a "Memorandum to Mr. Caldwell" which states: "(A)ll the present high-powered stations are backed by large electric or radio interests and were established early in 1921 or 1922. At that time these were practically the only organizations that saw the possibilities of high-powered broadcasting, had the engineering backing and financial ability to undertake such station construction." Butman, Carl, H., Secretary, Federal Radio Commission. NARG-167, Box 7, General Records of J. H. Dellinger. February 2, 1928.
[78] Jasanoff, Sheila, *The Fifth Branch: Science Advisers as Policymakers*, Cambridge: Harvard University Press. 1990. pp. 15.
[79] McMahon, A. Michal, Supra note 75. p. 163. Jome notes the probability that indirect advertising will support stations in 1926. Supra note 74. pp. 246.
[80] McMahon notes that the FRC and the IRE were so close during these early years that two of the five commissioners served as IRE Board members, too. Supra note 75. p. 164.
[81] Caldwell, Louis G. NARG-167, Box 87, General Records of J. H. Dellinger. August 17, 1928.
[82] Pickard, Sam. NARG-167, Box 87, General Records of J. H. Dellinger. August 31, 1928.
[83] Davis, Ewin, letter to the Federal Radio Commission, Federal Radio Commission, *Annual Reports Number 1-7, 1927-1933*, Reprinted in *History of Broadcasting: Radio and Television*, Supra note 7. pp. 134.
[84] Webster, Jr. Bethuel M. "Our Stake In the Ether," address to The American Academy of Air Law and The School of Law, New York University. April 10, 1931. pp. 9.

[85] Dellinger, J. H. NARG-167, Box 87, General Records of J. H. Dellinger. August 17, 1928.
[86] McMahon, Michal A., Supra note 75. pp. 152.
[87] Beard, Charles A. *The American Leviathan: The Republic in the Machine Age*. New York: Oxford University Press, 1941. pp. 297
[88] McMahon, Michal, A. Supra note 75. pp. 157.
[89] Jasanoff, Shiela. Supra note 78. pp. 17.