77TH CONGRESS
1ST SESSION

S. RES. 20

IN THE SENATE OF THE UNITED STATES

JANUARY 6, 1941

Mr. TOBEY submitted the following resolution; which was referred to the Committee on Interstate Commerce

RESOLUTION

Resolved, That the Committee on Interstate Commerce, or any duly authorized subcommittee thereof, is authorized and directed to make a full and complete investigation with

The Radio Battle of 1941

FM vs AM

by ALFRED TOOMBS
Special Washington Correspondent for RADIO NEWS.

Unknown to many, there is a terrific battle going on for the mastery of the ether. It involves millions of dollars and some real fighters.

A VAST and mighty empire is at stake in the battle which has taken shape behind the scenes in Washington. It is the empire of the great chain broadcasting systems—NBC, Columbia and Mutual; of the vast manufacturing plants of RCA and others; of the great leased wire system of the A. T. & T.

This empire is challenged and its immediate future is threatened by an aggressive, upstart band known as the FM Broadcasters, Inc. The Federal Communications Commission has given the FM Broadcasters the nod and has signed on with them as secret ally. The empire is gathering its forces and from the White House to Capitol Hill the opening skirmishes are being fought.

This is the hottest story in radio today and, though the sounds of battle have not yet reached the public, it will not be long before the implications become something more than matters of academic interest to almost everyone.

Relatively few people know, or care, much about Frequency Modulation now. Those who do know of it, think of FM merely as a method of clear-toned broadcasting, which has certain virtues which the standard AM has not. Almost no one realizes that the success of FM would mean that the whole face of American broadcasting would be changed. In the process, the strangle-hold which the big networks and high-powered AM stations have on the broadcasting business would be broken—or perhaps the chains would be lost in the struggle. Certain big manufacturing plants might find themselves fighting an uphill battle. The number of broadcasting stations might be increased rapidly and the whole employment picture, in the manufacturing and broadcasting fields, might be changed radically.

The FCC, the AM broadcasters and the FM broadcasters have taken all these things into consideration. They form the basis for the struggle which is in the making in the shadowy half-world where issues are fought out in Washington. There are billions at stake and there are powerful interests and determined men to contend for them.

The potent chairman of the FCC, James Lawrence Fly, has lined his big-business-busting compatriots on the Commission up on the side of FM. The Commission is going down the line for the new system. The FM Broadcasters have gathered together a group of comparatively unknown, but successful, radio men. They have the resources in cash and equipment to carry on broadcasting. They have the manufacturing facilities now to turn out the sets.

The AM broadcasters, sitting on a keg of dynamite which they can't afford to abandon to the enemy, are plotting a careful strategy to meet the attack. They are in an exposed position and their moves must be adroit.

The story has its beginnings back in 1933, when Major Edwin H. Armstrong, Columbia University professor of electrical engineering who had a string of radio patents to his name,

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let it be known publicly that he had perfected the Frequency Modulation method of broadcasting. He said he regarded it as the most important invention of his career—more significant than his invention of the regenerative, feed-back circuit, which made modern broadcasting possible.

At that time, Major Armstrong went to RCA with his invention and sought to interest them. He was a large stockholder in the company, by virtue of his earlier patents, and sought to sell them on the future of FM. They allowed him to use a television transmitter on the Empire State building for experiments which lasted a year.

Then they turned down the FM idea and told the Major they needed their transmitter back. Reportedly, President David Sarnoff of RCA looked with favor on FM, but his advisors talked him out of it. At any rate, Major Armstrong, embittered, vowed to do the job himself. With the money he had and was earning from his RCA stock, he began to build the broadcasting method which he hoped would upset the Amplitude Modulation applecart—including RCA.

He enlisted the support of Carman Runyon, a Yonkers, New York, coal merchant and amateur radio operator, and they continued work from Runyon's small station. In 1935, Major Armstrong went before the FCC to obtain permission to build a big station. The FCC looked down its nose at FM—but one engineer who heard Major Armstrong's arguments did not. He was Paul de Mars, of the Yankee Network in New England. He brought the inventor together with John Shepard III, who was head of that network.

Shepard was converted to the FM idea and built a powerful transmitter outside of Paxton, Mass. Soon, others followed in the experimental work on the new static-less, high-fidelity broadcasting. Last spring, the experimenters—banded together now as FM Broadcasters, Inc., marched to Washington to demand from the FCC the right to go on the air as commercial rivals of the powerful AM chains.

Up until this time, the FM system had been largely an engineering proposition in the minds of the FCC. The Commissioners are almost all laymen, with little knowledge of the technical side of radio. The membership of the Commission is predominately New Deal and the Commissioners had been doing battle with the big-business broadcasting chains—without any singular success.

When the FM Broadcasters began to unveil their creation, the Commission began to beam. For they saw the possibility of getting the big chains where they wanted them. The noise-free, high-fidelity qualities of FM were very nice—but the system had implications which went far beyond that.

This is one of the least understood aspects of FM broadcasting, and it is the crux of the current situation. FM is important not so much because it would bring about a complete change in the engineering standards of radio —*but because it would change entirely the economics of the radio industry.*

The present AM broadcast band "just grew." No well-planned system was established for allocating frequencies. The band became crowded and it became apparent long ago that there would be room for only a limited number of stations. Thus, an artificial restraint was placed upon the growth of broadcasting. There was not the question of how many stations the public would support—but how many there was room for.

Thus, the stations which grabbed off the first and best spots and held on to them were riding a sure thing. They were safe from very much competition and could look forward to the enjoyment of years in the sun. This situation made the New Deal Commissioners very unhappy, because they believed there should be free economic competition and it was their idea that the lack of this competition had created a great broadcasting monopoly.

When they heard the story of FM, they saw the answer to their problem. For FM would open an entire new broadcast band—which they could plan in their own way from the start. There would be room in this band for as many stations as could make a go of it financially. The artificial restraint would be removed.

So the FCC decided to give FM the "green light." In the months that have passed, it has become apparent that the Commission gave FM a whole boulevard strung with green lights.

The Commission set aside for FM use the band from 42,000 to 50,000 kc. This lavish assignment meant that Television Channel No. 1, on which RCA was doing some experimental work, had to be moved. The RCA people objected, but they lost the round. In order to give FM the full accommodation, it was necessary for thousands of Government stations to shift

also. This they did, on the FCC's assurance that it was for the best, without a peep.

In the course of the hearing, there occurred an extremely interesting argument on one point. The FM people had asked that each of their channels be 200 kilocycles wide. In that way, they explained, there was plenty of room for swing—which assured the high quality of FM reception.

The RCA position was that 75 kilocycles was wide enough for an FM channel. If the Commission established the channels at that width, the RCA men pointed out, it would not be necessary to move the television channel. The FM broadcasters contended that if they were limited to 75 kilocycles, their stuff wouldn't sound any better than AM broadcasts. It was only on 200 kilocycle widths that FM really worked. Furthermore, it was charged, the RCA men knew this very well. They knew that if they held FM to 75 channels that its effectiveness would be ruined and the whole system would be choked on the spot.

Columbia Broadcasting took no active part in the hearings, but through counsel introduced a statement upholding the RCA argument. There was a crisis here. But the FCC took its stand with the FM broadcasters. It said the channels would be 200 kilocycles wide, for the time being anyway. Later, if it deemed the move advisable, the Commission could reduce the bands to 75. Don't forget that—it gets important later on.

The FCC praised FM to the skies in its report. In the months that followed, it put out a blizzard of press releases and public notices on FM. In November, the Commission went far out of its way to call an engineering conference to discuss standards of transmitting stations for FM broadcasting. This action, which a statement from the FCC admitted "it would not ordinarily be concerned with," was taken to speed up the production of FM equipment.

There came more press releases, noting the establishment of new FM stations and commenting on the areas served. The experimental licenses, due to expire January 1, were extended for 60 days. The FCC was for FM, heart and soul. There could be no doubt of it.

While offering its arm to the FM broadcasters, the agile Commissioners were dealing out kicks in the shins to the AM chains. The monopoly report, prepared after a long study, hinted at dire things. The chains, it was apparent, were on the hot spot.

At this point, they find themselves faced with a situation which may, before long, become acute. They are at war with a hostile Commission, allied with an aggressive band of broadcasters, who are the possessors of a product which in many ways is undoubtedly superior.

The AM broadcasters are possessors of licenses which are good as gold, now. They are practically immune to competition from any new sources—in the AM band. If they abandon the AM band, they are forfeiting their security. If they stick to it, they may miss the boat on FM, if it catches the public fancy. They must face the possibility that hostile FCC activities will impede them, or that a war may come along and sweep them completely off the frequencies they now use.

So far, their fight to retain their empire has been defensive. There are indications that they are getting ready to become a little more aggressive, however. The AM broadcasters have been ignoring the FM blows—publicly. Their strategy is apparent.

The AM broadcasters have the field now—the equipment, the talent, the advertisers and the listeners. As long as the FM broadcasters have none of these, the AM chains don't have to worry. Columbia is participating in this grand strategy of "blockade," too. It recently barred its program from rebroadcast on FM stations.

But this situation cannot obtain indefinitely. The FM broadcasters have got some fighting men in their ranks. These men are working to effectuate a national chain of their own.

Who are these men who may be in the process of biting off a hunk of the empire of the air? The top man in FM is John Shepard. His name is mentioned almost in reverential tones around the FCC. He is a business man who controls a going thing in the Yankee network. His area, where natural and man-made interference is a serious problem, would benefit more by FM than any other part of the country, probably.

There is Walter J. Damm, of the Milwaukee Journal, Herb Petty, of Loew's; Louis Allen Weiss of the Don Lee chain in California; Paul Morency of Hartford, Conn.; Gene McDonald of Zenith, in Chicago; E. H. Scott of Scott Radio Laboratories, Chicago—there are half a hundred of them, mostly well-established and mostly yelling for blood.

The AM chains have foreseen the possibility of the formation of an FM chain, which may have the equipment and the talent. But, the strategists have ruled, the chain will never get any advertisers until it gets some listeners. And it can't get listeners until it gets some sets that will receive FM.

Now who's going to make the sets? Here the "ignore them and maybe they'll go away" strategy was applied again. RCA made no effort to begin the manufacture of FM receiving equipment. But it hasn't worked out so well.

For the FM broadcasters had enlisted the support of some manufacturers. Ray Manson, of Stromberg-Carlson, was one of their broadcasters. Irving Reed Wier, of General Electric, got his company making sets. GE is bringing out a converter, which can be hooked up to an AM set so that it will receive FM, to sell for $50.

[*Some of those who have joined the FM bandwagon are: Hallicrafter's and Scott of Chicago; Meissner of Mt. Carmel, Illinois, and Browning of Winchester, Mass. All are making FM receivers in one form or another.—Ed.*]

And jumping on the bandwagon with a Comanche yell comes Comdr. McDonald and the Zenith manufacturing outfit. McDonald is betting FM across the board. He is backing a station and is going to turn out FM sets faster than anyone suspects. He knows the dilemma that the AM broadcasters and manufacturers face—and figures to catch them napping.

At this point, then, we can see that the FM broadcasters aren't just going to be ignored away. The AM outfits have seen that the country's estimated four billion dollars investment in radio is at stake.

There are supposed to be more than 40,000,000 receiving sets in America, not to mention the auto-radios,—in which the public has invested over $3,000,000,000. The AM broadcasters have sunk more than $75,000,000 in their equipment and the Government and other agencies have more millions tied up in it. The three chains had net earnings of in excess of $60,000,000 last year. That ain't hay. And there's no reason to believe that AM broadcasters or manufacturers are going to let any considerable part of it get away without a fight.

There is another organization which is in the middle. The A. T. & T. received in the neighborhood of $10,000,000 last year from radio stations for use of its land lines. If FM cuts out the studio-to-transmitt line — by using direct transmission—or if it develops what Major Armstrong wants—an all-radio network—the A. T. & T. will lose a juicy slice of the melon. The A. T. & T. has offered to put in lines which will handle anything from 50 to 15,000 cycles for the FM broadcasters. They are asking a stiff price, however, and unless they come down they stand to lose the business if FM succeeds.

Now it is apparent at this point that the FM broadcasters are in a position to give the AM chains a battle. The FCC is intent on breaking the chains' hold on broadcasting. It wants to get the broadcasting industry on a new basis. If FM becomes universal, there will be no physical limit on the number of stations in one town. The interference problem is solved.

That means there will be two or three times as many radio stations in the United States. That means there will be more broadcasting chains and therefore more competition for the big ones. In the shuffle which would come with a shift from AM to FM, the FCC hopes that the big chains would lose their grip on the industry.

The FM broadcasters, because most of them are already in the business and are in a position to make money on their AM activities, can finance the infant through its early years. They have interested manufacturers who can put out the sets. There is no question but that FM broadcasters are in a position to menace AM's exclusive hold on the business.

Since this is true, and since we have seen the size of the stakes, we can get an idea of the battle that is being developed now. Washington is one of the main fronts of this battle. There are strange things in the wind.

Some strategists have urged that the President's influence be enlisted on the side of AM. After all, they argue, the radio—and they mention AM radio—has been instrumental in his success. He should feel some debt. These strategists would have the President pull the FCC off the chain's necks.

But, though the President may feel some obligation to the AM broadcasters and though he may not want to see the broadcasting industry juggled with in time of crisis, there is no evidence to show that he has taken sides. After all, he might have been re-elected by FM just as well as by AM.

In Congress, however, there is an opportunity for quicker action. The AM broadcasters can find some support there. It is obvious that they couldn't get very far buttonholing Congressmen with the complaint that somebody had invented a new kind of radio that was going to give them com-

petition. Things aren't done that directly in Washington.

The most logical *oblique* approach to the problem would be to stir up trouble for the FCC and encourage demands for an investigation. This could lead ultimately to some changes on the Commission, in the course of which those Commissioners who are "persecuting" the broadcasters would be disposed of.

By a coincidence, there have been outcries at the Capitol against the FCC. There is pending a resolution which calls for an investigation of the body, as well as of the radio industry. And last session, a Senate committee refused to confirm one of the business-busting Commissioners who came up for reappointment.

The resolution for the investigation was introduced by Senator Charles W. Tobey, who doesn't like the FCC nor the radio industry very well. It is reported that Senator Wallace White of Maine, a man well-informed on radio problems, has another such bill up his sleeve. If such a probe got under way, there would be Senators whose views were reasonably similar to the AM broadcasters.

[*Senator Tobey's Resolution, S. Res. 20, carries with it wide powers of investigation. Directed to, and presently resting with the Interstate Commerce Commission, one of the Senate's most powerful bodies, it provides for an initial outlay of $25,000 for the expenses of the investigation. It is believed that this sum was chosen at the low figure fixed to allay any suspicion of FCC adherents that the investigation would be sweeping. After all, the proponents of the Resolution reasoned, who in the opposition believes that much of an investigation can be carried on with $25,000. There is, however, nothing in the bill preventing the request for a greater appropriation later should the bill be passed and the investigation get under way.*

How far-reaching the investigation might become can be seen from the terms of the Resolution which are here quoted. It provides that the Interstate Commerce Committee . . . "make a full and complete investigation with respect to (1) the existence, extent, formation, legality, and effect upon the public or any individual or group, of any monopoly in radio broadcasting or any phase thereof or in the production, sale, or distribution of radio-receiving or broadcasting apparatus; (2) the administration by the Federal Communications Commission of those provisions of the Communications Act of 1934 as amended, which relate in any manner to radio communication; (3) the manner of exercise by licensees of the Federal Communications Commission of the privileges conferred upon them by their licenses from the Federal Communications Commission; (4) the effect upon the public interest of any contract pertaining to radio to which any such licensee or any broadcasting network is a party; and (5) and attempts made by any such licensee, broadcasting network, or any person, company, or corporation, engaged in any business relating to radio, or by any attorney, agent, or representative of any such licensee, network, person, company, or corporation to unduly influence any public official in the exer-

cise of his duties with respect to any matter pertaining to radio" . . . Ed.]

Remember the 75-kilocycle band that RCA wanted for FM broadcasters? When the Commission overruled that and assigned the stations to 200-kilocycles, it drew the rules so that this decision could be changed. A Commission unsympathetic to FM could kill off the infant just by changing this rule and confining FM to 75-kilocycle bands.

The FCC also laid down the rule that only one station in an area could be owned by an individual or organization—and that no more than six stations in the whole country could be controlled by one organization. That would knock the spots out of the chains, if they had to go into the FM field. Of course, such a rule could be modified by a more sympathetic group of Commissioners.

There are powerful men in Washington who know their way around the halls of Congress. The National Association of Broadcasters has its friends in Washington. Then there's the "97th" Senator — Mike Flynn, of the AFL typographical union. FM, which ties in nicely with facsimile broadcasting—for which no printers are needed—has not won his approval.

The battle will be fought obscurely and indirectly for a while. But it is deadly and it is being fought on all fronts—with no holds barred.

After all, there's an empire at stake. The war in Europe may be deadlier, but it won't be any more bitterly contested than this one. —30—

Electrons & Radioman's Future

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—blooms a tremendously important application of electronics.

Perhaps only a few of the individuals who have some present day association with radio and its allied fields will find some connection with this new art of probing for the invisible—no one knows—but at any rate there is a new horizon visible to the eye. The shadow of the coming event is clear cut and visible to all.

Electrons and the Medical Field

Short-wave therapy is commonplace in medicine, even though the research into the action of the radio wave on the body marches on, and not too much is fully known about the subject at the present time. But medicine is not confining its use of electronics to this field alone.

For a long time medical research workers have been investigating potentials developed in different parts of the human body. They were seeking very high resistance, very sensitive voltmeters. Developments in this field have progressed admirably, with simplifications of such equipment already in use in industry. These are d-c vacuum tube voltmeters. In certain ranges they are suitable for radio and industrial applications. With more sensitive ranges, they are usable in the medical field.

The use of amplifiers of extreme sensitivity and faithful reproduction are being used every day in investigation of human ills. Some of these amplifiers are so sensitive that the walk of a fly across a human hand sounds like an army marching across a tin roof. The problems confronting the developers of such apparatus were solved through the proper understanding of electronics. Many of the engineers whose work now is far removed from radio, got their start in the latter field, branching out as their respective interests guided them.

Cancer research goes to electronics when the doctors try to discover if cancerous growths give out, or radiate, potentials of definite frequencies. There is not any reason to suppose that the research into this scourge of mankind will not eventually find its solution in electronics.

Such a small thing as hearing, a little understood phenomenon, is being tackled with the aid of the electron, for there is a curious resemblance between the action of the human ear and an ordinary amplifier. The same is true of sight and television.

Those who are close to radio would under all normal conditions, unless the contrary is called to their attention, consider the electronic devices developed for radio applications as suitable only for the radio and allied fields. Actually, the fields where such developments may be applied are tremendous, but it is necessary to seek them out—to find where what is now available can be used and what is needed to comply with the requirements of special functions.

Electrons and Aviation

Radio has been the aircraft industry's backbone, for the radio beam and radio receivers have contributed tremendously not only to safety in flying but to the very fact that the public has accepted flying as a satisfactory mode of transportation because of the high safety record. For many years now past, the height of a plane over ground has been established by the difference in air pressure at sea level and at various altitudes above sea level, as indicated upon a meter. This always represented a hazard in that when visibility was poor there was danger of colliding with a mountain or some other obstacle, because the altimeter showed elevation above sea level and not *above* ground. A flyer can be 10,000 feet above sea level, yet be 3,000 feet below the peak of a mountain.

Electronics came to the rescue in the form of an ultra-high frequency modulated transmitting and receiving system operating at around 430 mc, which sends a wave towards the ground and picks up the reflection. The time elapsed between the instant of transmission and the instant of reception is automatically interpreted upon an indicator in terms of the altitude *above ground,* or whatever solid object reflects the wave. What is the significance of this development? Is it limited solely to aircraft? Not by a long sight! It is another one of those cases where the coming event is preceded by its shadow.

Just as a wave can be transmitted downwards from the plane, so can it be sent horizontally from the plane and the reflection used to indicate the presence of an obstacle ahead of the plane. At least such does not seem impossible in the light of the completed development of the electronic altitude indicator. And if such an indicator of objects ahead of the moving plane is practical why cannot it be used on ships during a fog and even