

**Before the  
Federal Communications Commission  
Washington, D.C. 20554**

In the matter of )  
 )  
Revitalization of the AM Radio Service ) MB Docket No. 13-249

To: The Commission

**COMMENT BY BRIAN J. HENRY**

I hold a Lifetime FCC General Class Radiotelephone license as well as an Amateur Advanced Class license and have been a broadcast engineer since the late 1970's.

I have constructed, repaired, and maintained countless AM broadcast stations over the course of my career and I am a former AM broadcast station licensee (KLLK-Willits, California). I am the proprietor of Henry Communications, a company that I founded in 1978, to provide technical services to the radio and television broadcast industry.

I currently do not have an interest in any broadcast property. I am participating in this proceeding because I am passionate about AM broadcasting and I want to help revitalize it.

**I. Introduction**

I would like to thank The Commission for issuing this Notice of Proposed Rulemaking as it attempts to mitigate some of its concerns regarding the long-term viability of the AM broadcast band. The AM broadcast industry needs your help and guidance.

Every ten years or so "AM Improvement" becomes a priority in the broadcast industry. It is always the same. There needs to be further deregulation. I would like to suggest that deregulation has gone far enough and that a certain amount of re-regulation and stricter enforcement of the existing laws could be helpful in the effort to revitalize AM.

I am concerned that the proposals that The Commission is considering may ultimately result in a degradation of AM quality and will not be an enhancement to the service.

In the Background section of its Notice of Proposed Rulemaking, The Commission goes into great detail to explain many of the factors that have caused the erosion of AM listenership. However, the technical remedies that are then proposed actually have the potential of further degrading the quality of service received by the public within a station's city of license rather than enhancing it. I feel that much of what The Commission is proposing in this Rulemaking proceeding has some potential to degrade the current level of service to a licensed community rather than improving upon it and could therefore ultimately result in the unintended consequence of reducing AM listenership further.

What about interference protection from non-licensed sources such as power lines, plasma monitors, and switching power supplies? What about improving coverage over the city of

license, improving audio quality, reducing interference, or better receiver quality? These are AM's real technical problems.

## **II. Open FM Translator Filing Window Exclusively for AM Licensees and Permittees**

Allowing AM radio stations to operate FM translators within their licensed coverage area gives AM listeners in the communities that they serve another reason to migrate from the AM broadcast band to the FM broadcast band. The AM broadcast band needs to be able to stand on its own merit! A potential enhancement to AM broadcasting might be to authorize low power synchronous AM boosters using low profile antennas to improve the signal level in locations throughout a station's authorized coverage area. While I am generally in agreement with the idea of giving AM broadcasters the same opportunity afforded to FM broadcasters and also to opening up an exclusive window for AM broadcast stations to attain an FM translator, this could ultimately result in driving more listeners away from the AM broadcast band forever. So while this might be helpful in the short term, it could actually backfire on the long term unless there is some other strategy in place that will result in an improvement to the listening experience on the AM broadcast band.

## **III. Modify Daytime Coverage Standards for Existing AM Stations**

Permitting AM radio stations to move their transmitter site farther away from the city of license will most likely reduce the amount of signal that is available for reception in certain areas of a given community. The Commission notes AM broadcast's susceptibility to interference from external sources and yet proposes to allow a radio station's city grade signal contour to encompass less of the community that it is licensed to serve. I find this to be somewhat perplexing as this proposal has the potential to reduce the amount of signal available to overcome external interference over a station's entire community of license rather than increasing it.

In a document, prepared for the NAB by Hammett and Edison, NRSC Reference Library Document No. NRSC-R13, "AM Technical Assignment Criteria: An Examination of Issues Raised in MM Docket No. 87-267<sup>1</sup>," Harrison Klein studies man made and atmospheric noise. He determined that under conditions of "intense" man made noise that a signal strength of 46.7 mV/m was required to attain a signal to noise ratio of just 26 dB 99% of the time. Dropping the signal strength down to 5 mV/m, the current AM city grade contour, the signal to noise ratio degrades to just 6.6 dB. This study was conducted over twenty-five years ago prior to the advent of switching power supplies and other RF generating devices that are now commonplace. It was not that long ago that The Commission authorized a reduction of the daytime city of license signal contour from 25 mV/m to 5 mV/m, which represented a 14 dB(!) reduction in the signal level required over the city of license. This current proposal could potentially result in a further reduction of a given station's signal over its city of license and would thus increase its susceptibility to interference. Generally speaking, the public benefits from broadcast transmission facilities that are located in relatively close proximity to the communities that they

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<sup>1</sup> See AM Technical Assignment Criteria: An Examination of Issues Raised in MM Docket No. 87-267. An AM Improvement Report from the National Association of Broadcasters, June 17, 1988. Harrison J. Klein, Hammett and Edison, Inc., Consulting Engineers, San Francisco, California on behalf of the AM Improvement Committee, Michael C. Rau, Staff Liaison, National Association of Broadcasters, 1771 N Street, NW, Washington, D.C. 20036. <http://www.nrsstandards.org/Reports/NRSC-R13.pdf>

are licensed to serve. With the increased level of interference that exists today, I do not feel that it would be in the public interest to degrade the daytime city of license signal contour further. I believe that The Commission should retain the existing AM daytime coverage requirements for all stations, subject to a waiver on a case-by-case basis and an appropriate showing.

#### **IV. Modify Nighttime Coverage Standards for Existing AM Stations**

One starts to wonder, what is the point of a radio station having nighttime authorization if it cannot provide interference free service to the community that it is licensed to serve?

As an alternative, perhaps another way to approach this would be to license AM broadcast stations to serve particular districts within its current city of license. Then, at least some part of the community would be guaranteed to receive full-time interference free service. If a radio station can't otherwise provide full-time interference free service to the community or district within the community that it is licensed to, then perhaps the next step would be for the station to file an application with The Commission to change its city of license to one that it could be of service to.

I feel that it is important that at least some portion of a station's licensed community be guaranteed to receive full-time interference free service.

In the vast majority of circumstances, a transmitter site that will provide interference free nighttime service over a community or district within a community will most likely be a satisfactory transmitter location for daytime operation, which typically is less constrained than the night operation. Ideally, a station's night operation should mirror the day operation as closely as possible to provide the public that it serves with consistent full-time service. To overcome the increased levels of skywave interference at night, a station's night operation generally needs to place more signal over the community that it is licensed to serve rather than less. I can see no public benefit to completely eliminating the nighttime coverage requirement. I feel that The Commission should retain the existing nighttime coverage requirements in their current form or possibly alter them in such a way that still requires the station to provide interference free service to a specific district within its licensed city full-time. Waivers could be handled on a case-by-case basis.

#### **V. Eliminate the AM "Ratchet Rule"**

The AM Ratchet Rule was well intended to reduce interference and in this respect, it has achieved some success, but it may have come at too high of a price. I concur with the findings of The Commission and feel that the AM Ratchet Rule should be repealed.

#### **VI. Permit Wider Implementation of Modulation Dependent Carrier Level Control Technologies**

While modulation dependent carrier level (MDCL) does improve overall input to output power efficiency, The Commission itself has noted, "The reduction of AM signal power at certain modulation levels inevitably exacts some penalty on audio quality<sup>2</sup>." However, it does seem that in the case of MDCL that the benefits may outweigh its disadvantages. Perhaps, The

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<sup>2</sup> See FCC Public Notice, DA 11-1535, September 13, 2011, "Media Bureau To Permit Use Of Energy-Saving Transmitter Technology By AM Stations." [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DA-11-1535A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-11-1535A1.pdf)

Commission could create some sort of measurement standard that stations could implement on a regular basis to insure that their MDCL operation is performing optimally. I feel that AM broadcast stations should be allowed to use MDCL at their discretion as long as all other FCC rules and regulations are met.

## **VII. Modify AM Antenna Efficiency Standards**

Relaxing the antenna efficiency standards will result in less signal coverage of the city of license unless increased transmitter output power or lower power synchronous transmitters using inefficient antennas are authorized to offset the difference. It is the radiated field that matters. An “inefficient” radiator can be driven with more power to attain the desired inverse field. Therefore, instead of having an “antenna efficiency standard” why not have a specified inverse field that must be attained at one kilometer from the transmitter site for a given class of service. Using this approach, the transmitter power could be adjusted to attain the required inverse field and there would be no need to adjust the signal levels that are currently in place. Since we are now using computer modeling for AM directional antenna systems, why not take it one step further and allow any kind of antenna as long as the protection criteria is met. The authorization of “inefficient” radiators could also facilitate alternative methods for increasing the signal strength within a station’s city grade contour using low power synchronous boosters with GPS disciplined oscillators and short verticals that don’t exceed the licensed coverage area. These low power transmitters could then overcome interference by proximity. This would be a bit more challenging to implement for night operation, but it could be a way to serve the public needs and the broadcaster’s needs. The good news about this approach is that synchronous digital single frequency networks actually work! There are many interesting antenna concepts such as an asymmetrical hatted dipole antenna that could also be applied to the AM broadcast band<sup>3</sup>.

## **VIII. Further Proposals and Comments**

### **A. Historical Perspective**

Amplitude modulation is a mature technology with transmitted audio quality capable of being nearly as good seventy years ago as it can be today. In fact, while transmitter efficiency has improved significantly, the audio performance specifications of an AM broadcast transmitter manufactured in the 1940s is nearly comparable to those currently in production. Furthermore, the original intent of the AM broadcast program chain was to deliver program audio content in such a way that the source material was transmitted to the receiver accurately and demodulated as such without “enhancements” such as dynamic re-equalization and multi-band audio compression. This is codified by FCC 73.1570(c), which states, “If a limiting or compression amplifier is employed to maintain modulation levels, precaution must be taken so as not to *substantially* alter the dynamic characteristics of programs.”

Until the early 1980s, AM broadcast stations were required to verify that their transmission equipment met the FCC's audio performance standard on an annual basis. This established a certain broadcast audio quality baseline that the United States citizenry could rely upon every licensed broadcast station to adhere to. The idea behind the

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<sup>3</sup> John Huggins, KX4O, has written a comprehensive article discussing asymmetrical hatted dipole antennas with additional references available here: <http://www.hamradio.me/antennas/asymmetrical-hatted-dipole-antenna.html>

deregulation of audio performance measurements was that the marketplace would decide. It did. Listeners abandoned the AM broadcast band altogether when it became intolerable to listen to due to degraded transmitted audio quality, ever increasing interference and poor quality cheap receivers. One great sounding AM radio station cannot overcome an entire band of terrible sounding ones demodulated by receivers that perform worse than a standard telephone line.

#### B. Enforcement of Existing Regulations

I feel that it would be in the public interest for The Commission to more vigorously enforce all of the existing technical rules and regulations and to reinstate a policy of making routine inspections. Regulation without enforcement is meaningless. Should The Commission return to a policy of doing routine inspections, I feel that a less punitive approach should be taken and that a licensee be given an opportunity to correct some technical deficiencies without fear of reprisal if the problem is promptly resolved. From my perspective, it often appears that the only rules that the Media Bureau is truly concerned about are associated with the EAS system, tower lighting, and the Public Inspection File. While these are important concerns, they really have nothing to do with radio frequency transmission and reception or interference protection. I believe that the broadcast industry as a whole would benefit from The Commission taking a more proactive approach to insuring that technical regulations are more closely adhered to.

The Commission might also want to consider re-establishing the requirement that AM broadcast licensees retain FCC licensed operators to maintain a station's transmission equipment. When FCC licensed operators are used to maintain transmission equipment, they are also invested in insuring that a given station is operating within its licensed parameters, as they will want to protect their valuable FCC certificate from revocation. When the Commission enforces a consistent high technical standard, both the broadcast industry and the public benefit.

#### C. Digital Operation

The vast majority of licensed AM radio stations are not embracing in-band / on-channel digital operation and those that are only exacerbate an already bad situation with regard to interference to analog operation, particularly at night. There is unfortunately no way for there to be a high fidelity analog AM broadcast transmission system when there is a digital service operating in the audio pass band between 5 and 15 kHz. The current combination approach is not benefiting either technology. They simply are not compatible. I feel that the public interest would be better served if the Commission authorized full AM digital operation at the broadcaster's discretion in lieu of analog operation. Implementing AM stereo may be a viable path forward for AM broadcasters until enough digital receivers have been acquired by the public to make the switch to all digital transmission a worthwhile consideration especially since some recently manufactured HD receivers are able to decode C-QUAM AM stereo.

I feel that it currently would not be in the public interest for The Commission to implement rules requiring stations to convert to all digital operation on the Standard Broadcast Band. In my opinion, this would create an undue financial hardship for many AM stations and would all but assure the bands' demise as the cost of implementing the

conversion to digital operation can in certain cases exceed the current market value of smaller market AM broadcast stations.

FM broadcasters are in a far better position to drive the digital receiver marketplace because the interference generated by hybrid digital operation is far less detrimental there. At some time in the future, each AM broadcast licensee could decide when to make the switch from analog to digital. This would keep the medium wave spectrum clean during the transition to all digital transmission. With today's technology, I am confident that a broadcast equipment manufacturer can produce a reasonably priced encoder that can create C-QUAM, HD, or Digital Radio Mondiale (DRM) modulation with the flip of a switch. An AM broadcaster could purchase an encoder today, use it in C-QUAM analog AM stereo mode and then they could switch to full digital transmission when they feel that the time is appropriate for them to do so. In the meantime, there would be something that an AM broadcaster could do to upgrade and improve their operation today. On the receive side, if new receivers are multi-mode, which is easily done with software defined radio (SDR) technology, the consumer won't know the difference when an AM broadcaster switches to digital transmission from analog.

#### D. High Fidelity AM Transmission

AM broadcasting is an audio program service and while the annually required RF spectrum measurements are effective at preventing radio frequency interference to adjacent channels and other services, they provide very little information with regard to how a particular station is performing within its own audio pass band. Reintroducing the requirement of an annual audio proof of performance<sup>4</sup> in combination with the already required annual RF spectrum measurements could help to insure that the transmitted audio facilitates wide bandwidth high fidelity demodulation.

No manufacturer of high fidelity audio equipment ever intentionally forced asymmetry of program audio and the loudness benefit of +125% modulation is of almost no significance. Ideally, an AM broadcast transmission chain should be configured in such a way that it accurately transmits the program material that it is presented with to the receiver without significant degradation to the source material. By limiting positive and negative AM envelope modulation peaks to 100%, the benefits of low distortion symmetrical audio and its resultant clean transmitted RF spectrum can be realized while achieving a modest reduction of interference to the first and second adjacent channel as well.

#### E. AM Broadcast Receivers

Without an improvement in AM broadcast receivers, there can be no AM Revitalization!

The single biggest factor in the technical decline of AM broadcasting lies with the deterioration in receiver performance. The vast majority of AM broadcast receivers do not have wide bandwidth audio frequency response that matches the transmitted audio

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<sup>4</sup> Here is an example of what was required in the annual equipment performance measurements that The Commission had previously required:  
[http://radiomagonline.com/tutorials\\_tips/engineers\\_notebook/manuals/AM\\_Proof\\_BroadcastEngineering2.pdf](http://radiomagonline.com/tutorials_tips/engineers_notebook/manuals/AM_Proof_BroadcastEngineering2.pdf)

frequency response and their audio frequency distortion performance is orders magnitude worse than that of the worst commercial AM broadcast transmitter ever manufactured<sup>5</sup>.

I believe that the public interest would be served by The Commission mandating an analog audio quality standard for AM broadcast modulation and demodulation with flat end to end audio frequency response from 50 Hz to at least 7.5 kHz with a 10 kHz receive notch filter and low audio frequency distortion that is modeled after the Electronic Industries Association and National Association of Broadcasters' AMAX certification program to help AM regain some of its technical footing<sup>6</sup>.

#### F. Interference Mitigation

To overcome high local noise levels, AM broadcast transmission facilities should be encouraged to maximize their signal over the entire city of license using whatever means possible without adversely affecting other licensed operations. One solution might be strategically locating multiple low powered synchronous transmitters within a station's protected service area that are in close proximity to the community of license rather than by the use of high RF power outputs from distant locations. I also feel that the Commission should only authorize new full-time non-directional or DA-1 facilities with consistent power day and night in order to maintain uniform full-time service to the public that a radio station is licensed to serve. If DA-2 operation were to remain an option, then I feel that the lesser of the two operations should be fully encompassed by the greater of the two to insure that the coverage of the two operations is as uniform as possible.

The Commission might want to also give some thought as to how it can better regulate unlicensed devices that create interference to licensed AM broadcast operations.

#### G. Frequency Allocations

Maybe, it is also time to take a fresh look at the AM broadcast band allocations scheme. The last time that this was done in the 1940s was not a huge departure from the configuration that was originally devised by the Federal Radio Commission in the late 1920s.

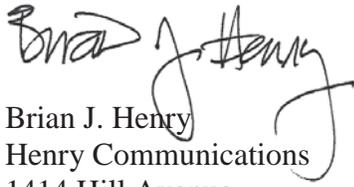
In conclusion, I would like to wish The Commission and the AM broadcast industry success with revitalizing the AM broadcast band, as this is not a trivial undertaking. I feel that there is nothing inherently wrong with the continued use of analog amplitude modulation on the Standard Broadcast Band for many years to come. It is spectrum efficient, it is relatively inexpensive to implement, it works well, and there is a huge receiver base that has been manufactured over the course of nearly one hundred years in place. It is probably safe to say that to this day there are more AM broadcast receivers in the hands of the United States citizenry than any other type of receiver. In the event of a local, regional, or national emergency, AM broadcast remains one of the most effective methods of disseminating mass communications. I feel that it is important that we do all that we can to protect this valuable public resource for future generations.

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<sup>5</sup> See NRSC-R100: Consumer Testiong of AM Broadcast Transmission Bandwidth and Audio Performance Measurements of Broadcast AM Receivers. <http://www.nrsstandards.org/Reports/NRSC-R100.pdf>

<sup>6</sup> See <http://en.wikipedia.org/wiki/AMAX>

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "Brian J. Henry". The signature is stylized with a large, sweeping initial "B" and a long, horizontal stroke at the end.

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