

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554**

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

To: The Commission

**COMMENTS OF THE
SOCIETY OF BROADCAST ENGINEERS, INCORPORATED**

1. The Society of Broadcast Engineers, Incorporated (“SBE”)¹ respectfully submits its Comments in response to portions of the Commission’s *Notice of Proposed Rulemaking*, 13-139, 28 FCC Rcd. 15221, released October 31, 2013 in the above-captioned proceeding (the “*Notice*”).² The Notice proposes “to introduce a number of possible improvements to the ... AM... radio service and the rules pertaining to AM broadcasting.” The Commission also seeks “to revitalize further the AM band by identifying ways to enhance AM broadcast quality and proposing changes to our technical rules that would enable AM stations to improve their service.” The Commission proposes to “help AM broadcasters better serve the public, thereby advancing the Commission’s fundamental goals of localism, competition, and diversity in broadcast media.” SBE applauds this effort and offers the following comments on some of the

¹ SBE is the national association of broadcast engineers and technical communications professionals, with more than 5,000 members worldwide.

² The *Notice of Proposed Rulemaking* was published in the Federal Register November 20, 2013. See, 78 Fed. Reg. 69629.

technical issues raised in this proceeding. Specifically, SBE offers its comments on four issues that will provide both immediate and long-term relief to AM broadcast licensees:

- (1) The elimination of the so-called “ratchet rule,” by which a Class A or B station which seeks to make facility changes which would modify that station’s AM signal are obligated to demonstrate that the improvements will result in an overall reduction in the amount of skywave interference caused to certain other AM stations.³
- (2) Permitting AM stations to use Modulation Dependent Carrier Level (“MDCL”) control technologies or algorithms that vary either the carrier power level or both the carrier and sideband power levels as a function of the modulation level; thus allowing AM licensees to reduce power consumption while maintaining audio quality and their licensed station coverage areas.
- (3) Modification of the AM antenna standards by replacing the “minimum efficiency” specifications for AM antennas with ‘minimum radiation’ in millivolts per meter, thereby allowing AM stations to use lower height antennas and enjoy more flexibility in site selection.
- (4) Commencement of an initiative to reduce, by Part 15 and Part 18 rule changes and stepped-up enforcement efforts relative to existing rules, ambient AM broadcast band noise, with an effort to significantly reduce AM broadcast band spectrum pollution, especially along public rights-of-way and in residential areas.

I. Introduction.

2. The initiation of this proceeding is both timely and urgent. Economic conditions for AM broadcast licensees and for skilled AM broadcast engineers have been difficult in the past decade. It has been 23 years since there was a comprehensive review⁴ of the AM technical rules. There have in the interim been numerous changes in the broadcasting environment that have conspired against, especially, AM broadcasters. These include decreasing availability of land to

³ See 47 C.F.R. § 73.182(q) n.1 (stations that “contribute to another station’s RSS using the 50% exclusion method are required to either reduce their contributions to that RSS by 10%, or to a level at which their contributions no longer enter into the 50% RSS value.”).

⁴ *Review of the Technical Assignment Criteria for the AM Broadcast Service*, Notice of Proposed Rulemaking, 5 FCC Rcd 4381, 4383 (1990); Report and Order, 6 FCC Rcd 6273, 6275 (1991); *recon. granted in part*, Memorandum Opinion and Order, 8 FCC Rcd 3250 (1993); *review denied*, *National Association for the Advancement of Colored People v. FCC*, 40 F.3d 474 (D.C. Cir. 1994).

accommodate AM antenna arrays and ground systems; increasing costs of electricity; and *very* substantial increases in ambient, man-made noise levels in the medium-frequency range, to name a few. It is timely now to address these changed conditions where possible through deregulation. SBE recognizes that some non-technical regulatory changes in the Commission's rules governing AM stations may benefit some AM broadcasters, such as the increased availability of the use of FM translators with AM stations and relocation of the AM broadcast band to some other portion of the radio spectrum. However, there are inherent inequities in any AM improvement plan that is primarily focused on FM translators. Such a plan would disserve AM broadcasters for whom an FM translator is not available due to FM band channel scarcity. Furthermore, that solution focuses listeners' attention away from the AM band. Another widely discussed solution, the relocation of the AM broadcast band would take so long to effectuate that it would not be helpful to the current generation of AM licensees. AM revitalization should have both short-term and long-term elements.

3. SBE suggests that the Commission enact changes to the AM rules that will encourage listeners to return to the AM band, and those that would alleviate some of the conditions that threaten the economic viability of AM broadcast stations now and in the future.

II. The "Ratchet Rule"

4. The "Ratchet Rule" requires, in effect, that an AM broadcaster seeking to make facility changes which would modify its AM signal must demonstrate that the improvements will result in an overall reduction in the amount of skywave interference that it causes to certain other AM stations. The AM station must therefore "ratchet back" its radiation at the pertinent vertical angle in the direction of certain other AM stations. Therefore, the rule will have one of several consequences: It will either: (1) deter any station facility upgrades that would otherwise improve

service from the station to the public, because such station improvements necessitate a power reduction; or (2) cause broadcasters that have to proceed with facilities changes to suffer the reduction of nighttime interference-free service. Of course, waivers could be sought and granted but if the rule does not have the intended effect, there is no reason to keep it, and a waiver process is administratively unwieldy and unnecessary in this context.

5. SBE supports deletion of the “ratchet rule”. It is well-known that the original intent of the rule was to reduce interference in the AM band, but this good intention has gone unrealized. The rule has not promoted reduced interference in the AM band. Instead, it has created other unintended consequences. The rule not only makes it extremely difficult for AM station licensees to relocate the station’s transmission facilities without substantial reduction in coverage; its mandatory coverage reductions often cause the station to lose long time listeners. This is inherently unfair inasmuch as many AM station relocations are forced; more frequently than not, station relocations are the result of factors beyond the control of the licensee, such as lost or cancelled transmitter site leases; land use changes; natural disasters; and a host of other reasons. Requiring power reductions in these situations compounds the difficulties created by environmental circumstances for AM broadcasters.

III. Modulation Dependent Carrier Level Control Technologies

6. SBE also supports a change in Section 73.1560(a) of the Commission’s Rules to permit, without advance Commission authorization, the use of Modulation Dependent Carrier Level (“MDCL”) control technologies or algorithms. This will permit environmentally responsible reductions in power consumption with no concurrent loss in audio quality or coverage area. Adaptive Carrier Control, Dynamic Amplitude Modulation; Dynamic Carrier Control and Amplitude Modulation Compadding are all reliable MDCL control technologies that

will not result in an increased risk of interference. The current process by which AM station licensees wanting to use MDCL control technologies, which is to seek either a permanent waiver of Section 73.1560(a) or an experimental authorization pursuant to Part 5 of the Rules (depending on whether the particular MDCL control technology to be utilized for a particular station has been determined), is cumbersome and unnecessary.

7. SBE agrees with the Commission's conclusion that MDCL control technologies can result in significant savings on electrical power costs without negative effects or interference. Therefore, SBE supports the proposed modification of Section 73.1560(a) of the Rules to provide that an AM station may commence operation using MDCL control technology without prior Commission authority, provided that the AM station licensee files a written notification to the Commission of the station's MDCL control operation within 10 days after commencement of such operation using the Commission's Consolidated Database System ("CDBS"). Rule changes that make it easier to implement MDCL are in the public interest. This technology was developed as the result of the growth of computer controlled transmitters that allow AM licensees to make substantial increases in transmitter efficiency without noticeable degradation of program quality. The reduction in monthly power costs created by this technology can make a significant contribution to survivability of existing AM stations. The existing procedure to obtain permission for the use of this technology is cumbersome. Broadcast engineers would prefer a simple CDBS notification procedure, similar to the one used for notification of digital operation. It is also desirable that, upon receipt of the electronic notification, a new modified license should be issued reflecting the fact of MDCL operation.

IV. AM ANTENNA EFFICIENCY STANDARDS

8. SBE supports the adoption of revised antenna efficiency standards for AM broadcast stations. AM broadcasters should be allowed to use short antennas where local land use conditions or local land use regulations so dictate, even though shorter antennas may be less efficient in terms of radiation efficiency. The Notice proposes to permit up to a 25 percent reduction in antenna efficiency. This appears to be the proper measured approach. Broadcast licensees should be permitted at their option to employ shorter vertical radiators as part of their antenna systems. The benefits of shorter radiators are obvious. Shorter radiators can be employed on land that might not otherwise support a full-size AM array, thus permitting flexibility in site selection. However, SBE does not recommend complete deregulation of antenna efficiency. Rather the Commission should continue to require a minimum level of performance of an AM antenna system.

9. Currently, if an AM broadcast antenna does not satisfy the minimum height requirements, the broadcaster is required to ensure that the effective field strength meets the minimum requirements contained in Section 73.184 of the Rules. SBE agrees *in part* with the position of the Minority Media Telecommunications Council (“MMTC”) that antenna efficiency is irrelevant, “provided that the minimum radiation is achieved.”⁵ Complete abandonment of efficiency and height standards is undesirable. The Commission’s proposed maximum reduction limit of 25 percent is appropriate. A greater reduction in efficiency could yield negative results, because shorter radiators tend to be difficult to match to a transmitter. This can also result in an unacceptable occupied bandwidth, negatively affecting modulation and signal quality. Such antenna systems can produce higher levels of skywave and other forms of undesirable station

⁵ See, the Notice, at Footnote 100.

performance. While SBE strongly supports the authority to use shorter radiators where necessary in the view of the licensee (for reasons related to availability of land, or due to local regulatory or environmental regulation compliance), the Commission should not completely deregulate antenna efficiency standards, which could lead to compromises in signal quality and performance.

10. SBE also supports a reduction of the minimum effective field strength standard that the Commission now employs. Section 73.189(b)(1) of the Rules states that good engineering practice requires an AM applicant to: (1) install a new antenna system or to make changes in the existing antenna system which will meet the minimum height requirements; or (2) submit evidence that the present antenna system meets the minimum requirements with respect to field strength.⁶ Thus, for example, for Class B, Class D, and Alaskan Class A AM stations, an antenna must either meet the minimum height requirements set forth in curves A, B, and C of Figure 7 of Rule Section 73.190, or alternatively provide a minimum effective field strength of 282 mV/m for 1 kilowatt at 1 kilometer from the transmitter. Also, for reasons set forth above, broadcasters should be allowed the option to employ a less efficient grounding system as long as such a system meets the overall minimum technical requirements proposed in the Notice⁷.

Modification of these rules to allow a reduction of the minimum effective field strength of 25 percent would have minimal impact on the listener as long as the broadcaster continues to comply with the minimum community of license coverage requirements. A reduction of the

⁶ See, the Notice at Footnote 108.

⁷ See, the Notice at Footnote 112 - 47 C.F.R. §§ 73.182(m) and Note (2), 73.189(b)(2)(i) – (iii). The new minimum field strength values would be as follows: for Class C stations, and stations in Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands on 1230, 1240, 1340, 1400, 1450, and 1490 kHz that were formerly Class C and were redesignated as Class B pursuant to §73.26(b) of the Rules, the minimum effective field strength would be 180 mV/m for 1 kW at 1 km (90 mV/m for 0.25 kW at 1 km); for Class A (Alaska), Class B, and Class D stations other than those covered in § 73.189(b)(2)(i), the minimum effective field strength would be 215 mV/m for 1 kW at 1 km; and for Class A stations, a minimum effective field strength of 275 mV/m for 1 kW at 1 km.

minimum effective field strength would provide flexibility to the AM broadcaster in antenna system design and site selection.

V. RF Noise

11. At paragraph 5 of the Notice, the Commission states candidly - and SBE suggests absolutely accurately - that “AM radio is particularly susceptible to interference from electronic devices of all types, including such ubiquitous items as TV sets, vehicle engines, fluorescent lighting, computers, and power lines. The noise on the AM band that is caused by those sources is only expected to increase as electronic devices continue to proliferate.” SBE suggests that this enunciation of the current and predicted future RF environment in the medium-frequency spectrum is overly fatalistic, however. It is SBE’s view that the goal of AM revitalization will never be realized in the medium and long term in the face of the headwind of a worsening RF noise environment in the AM broadcast band⁸ Some regulatory relief is absolutely necessary.

12. The current Commission and its recent predecessors have focused attention on maximizing efficiency in use of the fully deployed radio spectrum by such regulatory concepts as spectrum overlays, receiver noise temperature, and authorizations for unlicensed, “Part 15” RF devices and systems that neither demand interference protection nor are permitted by rule to cause harmful interference. All of these concepts have their place in a regulatory paradigm constrained by mature spectrum allocations and assignments. But the Commission does not now have, and in fact has never had, a complete understanding of ambient RF noise levels and trends thereof *over time*. Furthermore, the Commission has uneven regulations and policies governing noise-generating intentional, incidental and unintentional radiators; and its enforcement efforts in this context have been and are both impractical and insufficient. The combination of these

⁸ The same concerns apply to all bands between 9 kilohertz and 30 megahertz.

factors paints a dismal picture for the future of the AM broadcast band; for the survivability of AM stations in the near term; and for the AM listening public.

13. As the Notice acknowledges, AM listeners have media options. *RF noise will make them exercise those options.* They are not like some other interference victims such as licensees in certain services, who will complain actively when, for example, a power line; an RF lighting device, or a Part 15 intentional radiator causes interference to their receivers.⁹ When an AM listener receives interference, he or she *will not suffer it.* They will simply utilize different media. FCC interference resolution is premised on complaints. In making decisions with respect to RF emitters in the medium frequency and high frequency bands, the Commission relies far too heavily on the unenforced and largely unenforceable non-interference requirement generally applicable to Part 15 unlicensed devices. It is incontrovertible that AM broadcast band interference is not well-documented. Even if AM interference complaints were to be lodged from frustrated listeners, the Commission's Enforcement Bureau is not equipped to deal with them. Adequate staff does not exist, and attrition through retirement and hiring freezes has left the Commission's District Offices understaffed. Nor is interference from Part 15 devices to AM receivers addressed at the manufacturer level. It is the *user* of an RF device that is required to adhere to the non-interference requirement in the Part 15 rules. That is a regulatory paradigm that has failed in terms of keeping the aggregate level of man-made interference at manageable levels

⁹ AM listeners are in mobile environments, and power lines which frequently radiate RF noise are located along miles of roadways. Radiated RF energy from power lines is at very high levels in many areas for miles along power lines, making AM reception difficult or impossible. Complaints to both electric utilities and to the Commission's Enforcement Bureau about power line interference to HF and MF radio users have gone unaddressed ***for more than a decade in numerous instances.*** AM listeners are also located in residential environments. RF devices that are intended for industrial environments only are routinely sold to consumers who deploy them in residential areas. As but one example, an RF lighting ballast that is used for indoor gardening that is available for purchase from Sears has been recently measured for conducted emissions. The quasi-peak limit for this device is 48 dB(μ V). The measured conducted emission of this device at 6 MHz is actually 106 dB(μ V). Wide bandwidth, conducted emissions at those excessive levels will preclude AM broadcast reception over entire residential subdivisions.

in the AM broadcast band. Part 15 device users are almost inevitably non-technical persons with no interference resolution capabilities and no incentive to assist in resolving the problems, even if any might happen to be reported to them by an AM listener. Add to that the inherent difficulty in finding the source of RF noise from unlicensed (or licensed) RF devices, and it becomes apparent that RF noise from unlicensed Part 15 devices (and Part 18 Industrial, Scientific and Medical devices) is a large and - in the field - unmanageable problem.

14. AM Revitalization, in SBE's view, is not entirely a deregulatory exercise. Some existing regulations should be better enforced, and some new regulations will be required in order to improve ambient noise conditions in the existing AM band. It is obvious that any interference management plan for the AM band has to be based on rules which limit RF noise before it becomes an issue, not *post hoc*, and those rules have to be enforced. As but a few examples:

A. Radiated emission limits below 30 MHz in FCC Part 15 rules for unintentional emitters such as plasma television receivers should be enacted. There presently are no radiated emission limits below 30 MHz for most unintentional emitters. Only conducted limits exist now. This has become a short-range problem with respect to interference from some emitters, such as cellular telephones (especially in charge mode) and plasma television receivers. Direct radiation from and from plasma display can be problematic for AM receivers and difficult to remedy. The Commission should consider establishing limits on the amount of noise that can be radiated directly from such devices.

B. Lower limits in Part 15 for LED light bulbs should be enacted which are harmonized with the lower limits for fluorescent bulbs in the current Part 18 rules. Part 18 rules govern fluorescent bulbs. Those Part 18 limits are lower than the Part 15 limits which govern LED bulbs. The Part 15 LED bulbs typically operate at levels 12 dB higher than Part 18 fluorescent bulbs. All of the reasons that caused the Commission to establish reasonably low limits for fluorescent bulbs exist for LED bulbs. There are apparently very few, if any interference reports involving fluorescent bulbs that meet Part 18 consumer limits. There are, however, substantial numbers of complaints of harmful interference to Amateur Radio stations from LED light bulbs on an annual basis. This is a good example of an RF management problem that must be addressed *before* the devices are marketed. There could be dozens, if not hundreds, of RF light bulbs in range of a typical AM broadcast

receiver in a typical residential neighborhood. If harmful interference occurs and is reported, there is no practical, *post hoc* solution. Filtering of the bulb is not an option. They couldn't all be found, even if adequate Commission resources were available to investigate such instances. Even if they were to be found, the user of an RF light bulb that contributed to AM receiver interference would not likely be ordered by the Commission to stop using it.

C. Better external labeling on packaging for Part 18 fluorescent bulbs and ballasts should be ordered. Part 18 rules have separate limits for consumer and commercial fluorescent devices. A number of box stores and large hardware and consumer retailers, including some well-known nationwide chains are openly selling commercial fluorescent bulbs and ballasts to residential consumer users. Presently, there is no information on the outside of the packaging for these devices indicating that they are not legal to use in residential environments. These same big box stores are all selling Class A industrial lighting ballasts. There is material in the Office of Engineering and Technology's "Knowledge Database" (KDB) clarifying that such marketing is not legal and that the labeling, or even signage and warning, is not enough. If this policy (it is *not* a specific rule) were to be enforced, the big box store would claim that they can sell commercial environment ballasts because they also sell them to buyers for that market, but the devices are on display and the general public is not informed of the proper environment in which to deploy them.

D. Specific radiated and/or conducted emission limits for incidental emitters such as motors or power lines should be enacted. Under present Commission rules, there are no specific emission limits for incidental emitters such as power lines and non-pulsed motors. There are requirements for manufacturers of incidental emitters to use good engineering practice and a requirement that the operator of an incidental emitter use them in a way that does not cause harmful interference to licensed users of spectrum. Those rules are neither enforced, however, nor practically enforceable. Specific emission limits would set an upper level on the worst of the power-line noise cases and would require manufacturers to pay at least minimal attention to design and utilities to evaluate their entire systems at least sporadically, assuming that they perceive that there is a risk of actual Commission enforcement. Although conducted-emission limits could be established for motors and similar 120- or 240-volt devices, only radiated limits would be practical for medium-voltage or high-voltage power lines.

E. Conducted emission limits on pulse-width motor controllers used in appliances should be enacted. Under Part 15 rules, "digital devices" used in appliances are exempt from specific emission limits. There are instances of interference to AM receivers from pulse-width motor controllers in washing machines, air conditioners and pool pumps. If pulse-width motor controllers are digital devices, then these 500- to 1500-watt digital devices would be exempt. Most digital devices that are used in appliances are very low power display units, microprocessor control circuitry and similar devices which have a much lower interference potential than 1500-watt

motor controllers.

F. The Commission should substantially increase, and increase the visibility of, enforcement in power line interference cases. There are numerous complaints from Amateur Radio operators of severe interference from power line noise annually. Power line radiation in the HF and MF Amateur allocations will in most cases directly translate to preclusive noise in the AM broadcast band. The Commission has relied completely on the good faith efforts of electric utilities to resolve these. In some cases, those efforts have been successful. However, more often, utilities do not have available to them and are not willing to retain persons skilled in RF interference resolution and the cases at FCC are allowed to languish unresolved for years, and in some cases more than a decade, without any enforcement action at all. As discussed above, AM radio interference inevitably goes unreported by listeners. A few visible enforcement actions by the Commission would create some incentive on the part of electric utilities industry and perhaps lead to the development of effective industry programs to address the burgeoning power line interference problem.

Improvement in the noise environment in the AM broadcast band will, over time, contribute substantially to the revitalization of AM broadcasting. The Commission should commence this longer term initiative without delay.

VI. Conclusions

15. This proceeding is gratifying. There are numerous different perspectives on the best means of remedying some of the challenges to AM radio broadcasting. SBE is supportive of the elimination of the ratchet rule; the use of Modulation Dependent Carrier Level control technologies or algorithms; the relaxing, but not the elimination, of AM antenna efficiency standards; and the commencement of a multi-faceted initiative to reduce RF noise in the medium-wave bands. There are other proposals in this proceeding that will inevitably improve AM broadcasting. SBE considers the issues addressed herein to be the most urgent of these. It is hoped that the Commission will not treat this proceeding in the nature of a Notice of Inquiry. The adverse circumstances of AM broadcasters and skilled AM broadcast engineers call for some

urgent regulatory relief. There is a potentially bright future for AM broadcasting, but the Commission's role in this process is substantial.

Therefore, for the reasons discussed herein, SBE respectfully requests that the Commission proceed without delay to implement the regulatory relief suggested herein.

Respectfully submitted,

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