Comments on MM Docket 94-130

Submitted to the Federal Communications Commission by:
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Introduction

These comments are submitted in response to the above cited Notice of Proposed Rulemaking. Hallikainen & Friends has been manufacturing transmitter control systems for the broadcast industry since 1976. Harold Hallikainen has carefully researched FCC technical regulation of broadcast stations to write the monthly series Insight On Rules for Radio World newspaper (since 1987), to write the National Association of Broadcasters Chief Operator Guide, and to write the chapter on transmitter control systems in the current NAB Engineering Handbook. These comments are based on well-informed opinion.

Unlicensed Operators

Many will probably comment against further reduction in operator qualifications since there appears to be many unqualified operators currently employed by stations. In my review of several years of FCC violation notices (received through FOIA requests), the lack of qualified operators, especially station chief operators, is readily apparent. Chief operators, who are responsible for insuring the technical operation of a station complies with FCC regulations, are often ignorant of FCC regulations. We might argue that the

demonstrated lack of qualified operators in stations requires the Commission to retain operator licensing or to bring back exams for operator licenses. However, as the Commission pointed out when it eliminated the Broadcast Endorsed Third Class Radiotelephone License, the FCC is not in a position to judge the qualifications of operators. When the exams existed, memorization schools and other similar systems minimized the effectiveness of the exams. As the Commission decided at that time, I believe it is up to the station licensee to hire qualified operators. FCC licensing of operators does not guarantee qualified operators. It also may not significantly increase the qualifications of operators.

There is, however, a significant problem with unqualified operators. I believe this is best dealt with by increasing station inspections, including use of the proposed FCC Self Inspection Report (which was suspended apparently based on NAB objections).

Reliance on Highly Stable Transmitters

Paragraph 9 of the NPRM discusses the possibility of "specially designed, highly stable state-of-the-art transmitters" for unattended operation. This possibility did not make it into the proposed rules (see 73.1400(b) of the proposed rules).

There are two ways a station may find itself in a noncompliant condition. The first would be due to drift of the transmission system. A "highly stable" system could take years to drift out of tolerance, thus minimizing monitoring requirements. The second method by which a station could be in a noncompliant condition would be a component failure in the transmission system. Such failures could be detected by an independent monitoring system. They could go undetected if stations relied upon a "highly stable" system to remain within tolerance. For example, the Studio to Transmitter Link transmitter

in a station where I was employed used a crystal oven to maintain transmitter frequency stability. Based on annual measurements, it was determined that it would take seven years for the transmitter to drift outside tolerance. However, at one point the thermostat in the crystal oven stuck in the "on" state, causing a significant rise in the crystal temperature, thereby causing the transmitter to be significantly off frequency. This off-frequency operation could have gone undetected for months if it had not been such a significant frequency deviation that it caused the STL receiver (which could be considered an independent monitor, had the discriminator output voltage indication been calibrated to indicate frequency deviation) to lose a subcarrier. Investigation as to the reason for the loss of the subcarrier led to the dectecion of the off-frequency operation. In summary, reliance on a "highly stable" system does not insure against out of tolerance operation due to component failures. For those parameters that the Commission feels are the most likely to cause significant interference (such as AM directional parameters and mode changes), I suggest the Commission require periodic (such as the three hour requirement on non-approved directional station sampling systems) measurement of those parameters by instruments with an independent reference. By "independent reference" I mean something independent of the transmission system itself. For example, if modulation is one of the parameters the Commission considers most critical, modulation measurement should be based on an RF sample of the transmitter output. Precision references that determine the measurement indication (perhaps frequency standards in FM monitors and voltage standards in AM monitors) should be independent of the references used in the transmission system itself. It is extremely unlikely that the reference in the transmission system and the reference in the monitor system would fail simultaneously in in a manner that would hide an out of tolerance condition. An out-of-tolerance

indication MAY be an indication of monitoring system failure as opposed to transmission system failure, but the operator is notified (in attended stations) or the station is taken off the air (in unattended stations) until it is determined that the station is indeed not causing interference.

The Commission has been moving away from specifying HOW a station determines it is in compliance with station specifications. It MAY, therefore, not wish to impose this "independent reference" requirement on ANY parameters, leaving it to the station licensee's discretion. The Commission could then cite stations for operation outside licensed parameters, but could NOT cite stations for inadequate monitoring if during an inspection it found all parameters to be within licensed limits. The current rules do NOT specify ANY monitoring requirements (except on directional AM stations), yet stations are being cited for having inadequate monitoring capability. For example, in case DV-93-1954, television station KFHT was cited because the operator did not have sufficient indications at the control point to determine the transmitter output power. The station was NOT cited for out of tolerance operation. The current rules do not require a station to have a power indication available to the operator; the station was apparently operating within authorized power limits; yet it was cited for not having "sufficient control and operating parameter capability to allow technical operation in compliance with the Rules...". It has been standard practice for stations to have a power indication available to the operator, but it is not specified in the Rules. If the Commission wishes stations to measure certain parameters at specified intervals, it MUST state those parameters and intervals in the Rules. If this determination is indeed to be left to the licensee's discretion, the Commission should not cite stations for using its discretion.

ATS Requirement for Unattended Stations

Paragraph 10 of the NPRM asks for comment on requiring ATS for unattended operation. Should the station decide that some transmission parameters have such a significant interference possiblity as to require FCC imposed periodic monitoring, the Commission should specify which parameters require periodic monitoring (whether by an operator or an automatic system), how often those parameters are to be measured, and how long a station may continue operation after detecting an out-of-tolerance condition. If an ATS requirement is imposed, it should clearly state that such an automatic system MAY adjust the transmission system to return it to within tolerance condition OR may merely alarm the out-of-tolerance condition and shut the station down within a specified period of time.

Unattended Operation of Stations Without Approved Antenna Sampling Systems

Paragraph 11 requests comment on this subject. I see no reason to impose additional system parameter monitoring requirements on stations with non-approved sampling systems over those imposed on stations with approved sampling systems. The use of a non-approved sampling system does not decrease the stability of the directional array and does not increase the likelyhood of a component failure causing out-of-tolerance operation. A non-approved sampling system does, however, decrease the stability of the monitoring system. It is unlikely that drift of the monitoring system would hide drift of the directional array itself, since it is unlikely that the array and the monitoring system would drift the same amount and the same direction simultaneously. If the Commission wishes to impose tighter requirements on stations with non-approved sampling systems, those requirements should

compensate for the less stable sampling system instead of increasing a stations reliance upon it. Should tighter requirements on such stations be necessary, it is suggested a specified interval between measurement of field strengths at monitoring points be imposed.

Mode Changes

Paragraph 12 of the NPRM correctly points out the extreme importance of insuring AM station mode changes are performed at the proper time. Failure to make these mode changes is probably the cause of the most serious interference. Automatic monitoring equipment can easily determine that a mode change was properly performed by measuring certain parameters (station output power and directional antenna monitor parameters). A control system failure (such as the clock drifting) could cause improper station operation. As such, the Commission MAY want to require an independent system that changes the mode and a second system that verifies that the mode did indeed change (the station is operating within tolerance for the parameters currently in effect).

Mode changes are especially important since for most other parameters, a control system failure causes the transmitter to take no action, probably continuing in-tolerance operation, just as it was operating before the control system failure. Continued stable operation of a transmission system through a required mode change time because of a control system failure, however, results in significant interference. For this reason, mode changes require special treatment.

Should the Commission continue its reliance upon station licensees in determining monitoring requirements, the new Rules COULD make no special monitoring requirement with regard to mode changes. Instead, the Commission would cite stations for out-of-tolerance operation, should that occur, rather than

lack of some unspecified monitoring equipment, whose lack has NOT caused out-of-tolerance operation. As a second alternative, the Commission COULD require an independent monitoring system (as discussed above) for unattended operation. A station licensee COULD use an operator as an "independent monitoring system" insuring that mode changes occured at the proper time. As such, stations may be permitted to operate unattended with simple monitoring systems (or no monitoring system should it be permitted to rely upon transmission system stability) IF an operator is in charge of the transmission system during mode changes.

Summarizing, the Commission appears to have these options:

1. Leave monitoring to station licensee discretion.
2. Make monitor/control system specifications.
3. Require independent monitor/control of mode changes.
4. Permit (or require) operators to insure mode changes occur while running without operators the rest of the time.

Tower Light Inspections

Paragraph 15 of the NPRM discusses tower light inspections. Due to safety of life considerations, tower light inspections are extremenly important, considerably more important than preventing the possibility of interference to other broadcast stations (as most other measures considred in this NPRM). A fail-safe method of insuring FAA notification of tower light failures is required. The current daily observation by an operator appears to be a mimimum requirement. With appropriate telemetry, this "observation" could be made from any location. Requiring an operator to spend less than five minutes to determine tower light operation daily seems like a minimal requirement. I'd suggest that as a minimum this requirement be retained.

Various possibilities for automation exist. I would suggest that any such automatic systems notify the FAA of proper tower light operation daily instead of notifying the FAA of tower light failures. Relying on failure notification leaves the FAA unnotified should the monitoring system fail.

If acceptable to the FAA, automatic monitoring systems could notify the FAA of proper tower light operation by telephone using synthesized voice or fax. In such a case, the FAA would most likely have a checklist where they would check off each station's light operation each day. They would notify pilots of any station whose light operation is not verified.

This system could also be automated at the FAA end of the system by having reports phoned by station tower light monitoring systems to an FAA computer which would then make that information available to Flight Service Station personnel for pilot notification.

Emergency Broadcast/Alert System

Paragraphs 16 and 17 of the NPRM discuss EBS and EAS. Unattended operation with the existing EBS system is unworkable (though "off-premises" control with an operator at a distant control point is successfully being done). The automatic program interrupt and program restoration capabilities of the newly adopted EAS system would permit unattended operation of stations while insuring the public is alerted to emergency conditions. I propose that unattended operation of stations be permitted only when that station and the EAS sources it monitors have the new EAS system fully in operation and that the unattended station has the system configured for automatic program interruption and restoration.

Operator License Requirements

Paragraphs 19 through 21 address this issue. As discussed previously Commission licensing of operators does not appear to improve operator quality. Further, the existing Restricted Permit (which is issued with no exam) makes NO determination of operator quality. It appears unnecessary for the Commission to continue to require broadcast station operators to hold this permit.

The only argument in favor of retaining the RP requirement on broadcast station operators that is readily apparent would be for the requirement to serve as a minimal "registration" program. A station licensee could rely upon the fact that an operator has not violated the Commission's Rules to such an extent that the Commission has revoked the Restricted Permit. This seems to be minimal assurance to station licensees.

Paragraph 14 of the NPRM questions whether license requirements should be relaxed on various related services (low power television, internation broadcast stations, experimental broadcast stations). I believe no change in interference levels would occur if an existing RP operator requirement were to be be reduced to an unlicensed operator requirement, for the reasons discussed above. Requiring an operator AT ALL (looking at unattended operation) would require an evaluation of interference possibilities and the severity of that interference, and whether automatic monitoring equipment could make such interference as likely, at most, for unattended stations as for those with operators. Power levels at international broadcast stations make interference (especially outside the US) more serious. Due to shared use of frequency bands, international stations may also cause interference to stations other than broadcast, which may be more serious.

Finally, paragraph 14 points out that 47 USC 318 still requires licensed operators to be present when required for safety of life purposes. I believe the

intention of this section is to protect the life of the PUBLIC (such as the protection afforded by ship radio operators) as opposed to OPERATOR safety. The existing RP makes no determination as to whether the operator is qualified to protect the safety of the public OR the operator. As such, it appears unnecessary for broadcast stations. Further, operator safety is under the jurisdiction of the Occupational Safety and Health Administration. A Commission duplication of this effort, especially if it is merely a reliance upon the RP, appears useless.

Parameter Telemetering and Operator Proximity

Paragraph 23 of the NPRM considers these issues. As discussed above, SHOULD the Commission choose to not rely upon the station licensee to determine which (if any) parameters must be telemetered, the Commission should specify in the Rules exactly which parameters must be available to the operator for each type of station. The current Commission procedures of citing stations for not having telemetering of some unspecified parameters is unacceptable. The Commission MUST either specify those parameters OR only cite stations for out-of-tolerance operation, not lack of monitoring equipment.

For stations with an operator in attendance, I suggest the current control and telemetry proximity requirements be replaced with an "operator response time" requirement. If the Commission decides to specify specific parameters the operator must have available at all times, I'd suggest the operator be able to provide the Commission with the specific values of those parameters within three minutes of the Commission request. Such request may be by telephone or during an FCC inspection of the station. The station licensee may then determine how far from duty positions telemetry indications may be located. Further, transmitter controls should also be located such that the operator can

return a station to a Rule-compliant condition (either by making an adjustment or turning the transmitter off) within three minutes of FCC notification. This three minute limit would determine the location of controls and may place limits on control techniques (discussed below).

Contact Person

Paragraph 24 of the NPRM discusses this issue. In determining contact person requirements, consideration should be given to how quickly the Commission must be able to contact such a person to take corrective action in the operation of a station. Currently, the Commission is notified of the LOCATION of the transmitter and all control points. The Commission is not necessarily notified of a telephone number for reaching a station operator. Requiring FCC personnel to travel to where the operator is located in order to take an interfering station off the air would allow interference to continue for a significant period of time, yet that is all the current Rules require. Should the Commission wish to improve upon this response time, they MAY wish to have a telephone number and password to directly access station control equipment. The Commission's proposal of an FCC database maintained by individual stations also appears workable. If a contact person requirement is implemented, I'd suggest the Rules clearly spell out that person's responsibilities. These responsibilities would include a maximum amount of time allowed for the Commission's staff to reach that person (possibly requiring the contact person to carry a pager or cellular telephone) and the maximum amount of time that person, once contacted, would have to return a transmitter to a Rule-compliant condition.

Specified Parameters and Out-of-Tolerance Operation Duration

Paragraph 28 of the NPRM gives examples of several parameters which, if out of tolerance, may cause interference to other stations. Commission Rule changes over the past 25 years have recognized that continuous monitoring of certain parameters may not be necessary. For example, measurements of carrier frequency have been reduced from at least every 30 minutes (in 1970) to the current "as often as necessary", leaving the measurment interval to the station licensee. As such stations should only be cited for off-frequency operation. If they are on frequency, the licensee's monitoring schedule (however loose) would have to appear satisfactory. Further, the Commission has removed the requirment that stations have an approved modulation monitor indication available to the operator. Instead, stations are to not overmodulate.

Should the Commission wish to require specific parameters to be monitored (either by an operator or by an automatic system), the specific parameters for each type of station should be listed in the Rules. The reading interval should also be listed in the Rules. I do not see any reason for the parameters that require monitoring (if any) and the interval between measurement should be any different for attended or unattended (where automatic equipment measures the parameters) stations.

Appendix A, paragraph 14 of the NPRM shows a proposed revision of section 73.1400. 73.1400(a)(2) does NOT specify which parameters the Commission expects a station to frequently monitor. As such, it appears that the Commission could NOT cite a station for monitoring violations, even if NO parameters are monitored by the operator (or automatic control system). The Commission could, however, find that a station was indeed operating out of tolerance. As discussed above, the proposed Rule is not acceptable. To make the Rule enforceable, it needs to either specify the parameters to be monitored OR to not

specify monitoring at all, instead concentrating on requiring parameters to be within tolerance.

The three minute response time by manual or automatic means appears appropriate.

Out-of-Tolerance Operation of AM Directional Arrays

This subject is referenced in pagagraph 31 of the NPRM and paragraph 4 of Appendix A. The NPRM properly takes into account the difficulties encountered in the operation of directional arrays. The NPRM, however, would permit out-of-tolerance operation of a DA for 24 hours no matter how far out of tolerance the condition is. In the case of a component failure, this COULD cause significant interference for 24 hours while other stations are limited to three minutes for much less significant interference (such as operating slightly above the 105% power limit). As such, I'd suggest directional stations be permitted to continue operation at full power for 24 hours while monitor point field strength readings are being taken PROVIDED the antenna monitor indications are within two times the licensed tolerances (for noncritical arrays, this would allow a phase deviation of six degrees and a current ratio deviation of 10%). For more significant deviations, the Commission should require immediate (within three minutes of detection) power reduction to some percentage of authorized power as an attempt to insure that radiated fields towards protected stations remain within tolerance.

Once a station has determined that its current "parameters at variance" condition does comply with radiated field requirements (at either full or reduced power), monitor point measurements should be repeated should there be a SIGNIFICANT change in antenna monitor indications. How much change is SIGNIFICANT should be defined in the Rules. I'd suggest use of the station

license tolerances once again (noncritical array stations would be permitted a 3 degree variation in phase or a 5 percent variation in current ratio) to determine when measurment of monitor point fields would again be required.

Monitor Accuracy

This issue is discussed in paragraph 38 of the NPRM and section 73.1350(c)(2) of Appendix A of the NPRM. The NPRM proposes that monitor and instrument accuracy be taken into account in determining station operating tolerances. This is a significant departure from typical station operation. Stations currently keep the INDICATED parameters within licensed parameters, realizing that the indication actually is some specified percentage from the actual parameter. Applying the new approach, we can look at section 73.1215, which outlines the requirements on indicating instruments. If we look at an AM station base current, we find it must be accurate to within 2% of full scale, and that the full scale indication is to be no more than three times the minimum normal indication, permitting the error to be up to 6% of the indication. If a station has a licensed power of 1 KW with an antenna resistance of 50 ohms, the minimum authorized power would be 900 watts, while the maximum would be 1.05 KW. This limits the ACTUAL antenna current to between 4.243 Amperes and 4.582 Amperes. Taking the possible 6% error in the meter indication, the INDICATED antenna current must be maintained between 4.574 Amperes MINIMUM and 4.322 Amperes MAXIMUM. Since the MINIMUM is greater than the MAXIMUM, a station would have no way of complying while relying upon indicating instruments that meet Commission requirements. Before instituting the proposed change (73.1350(c)(2)), the Commission should carefully evaluate all existing parameter limits and consider widening these limits to allow for instrument inaccuracy.

Remote Control Communications Methods

The proposed restrictions on "dial-up" systems seem unnecessarily restrictive. Whether the circuit linking the operator to the transmitter is permanently established or is established only when information is to be transmitted (such as dial-up (circuit switched) or data packet switched networks) makes little difference to system reliability. Instead, I would propose the Commission specify a "minimum response time" and a "maximum interval between system integrity checks". For a minimum response time, I would suggest the Commission require licensees be able to return a station to a Rule-compliant condition (possibly turning off the transmitter) within three minutes of FCC request. Further, the transmitter site unit of a remote control system should verify the ability to contact the control point where an operator is located at least once every three hours (using the existing telemetry failure timing). Stations utilizing full-time circuits would be required to have the transmitter automatically shut down within three hours of a failure of that circuit (this is a return of the fail-safe provision of the early 1970's, but with a specified time-out). Stations using switched circuits would also be required to have the transmitter shut down within three hours after a failure of the ability to establish contact between the control point and the transmitter site. I would expect many dial-up systems to place a call hourly between the transmitter and control point. A call failure would alarm the operator, who then has two hours to correct the problem before the transmitter is shut down. A three hour limit seems reasonable, since with a control failure the transmitter will probably continue to operate in a compliant condition. Special consideration may have to be made for those stations that have a mode change. A failure in the circuit COULD result in up to three hours operation in an improper mode.

For those stations utilizing a standard telephone as the "studio unit" of a dial-up remote control system, the proposed three-hour fail-safe could be easily implemented with existing equipment by adding an external three hour timer at the transmitter site. This would shut down the transmitter should it be allowed to time out. The duty operator would dial the transmitter site every hour or two to reset that timer, keeping the station on the air.

This fail-safe approach appears preferrable to a vague "alternate method of acquiring on-off control". Stations should also be able to demonstrate to Commission staff that they can turn the transmitter off within three minutes of receiving the request, no matter what circuit type is utilized.

Requirements for Antenna Monitor Authorization

Appendix A paragraph 2 proposes wording of 73.53(b)(9) to determine the external connection requirements for antenna monitors used at stations operating by remote control. If an ATS system is to use antenna monitor indications, the monitor must be of this type. The last sentence of this section might be modified to say "... the monitors are not acceptable for use at stations using remote control or ATS for the operation of directional antennas."

Parameters Affected by Modulation

Paragraph 19 of Appendix A of the NPRM specifies (as the current Rules do) that parameter indications whose values are affected by modulation are to be read without modulation. If the variation is minor, this requirement seems unduly burdensome. I would suggest that this requirement specify HOW MUCH an indicated parameter must vary before it must be read without modulation. I'd suggest it be permitted to vary 2%, which is a number often used in the Rules for allowed error in indicating instruments.

Conclusions

This Rulemaking proposes a major change in the technical operation of the broadcast industry. I hope that the Commission will take all the comments and rely comments into consideration and then issue a FNPRM on this issue for more comment. I believe the changes required in the proposed Rules in Appendix A to make the new Rules workable are major enough to require another round of comments. We would then be able to suggest minor changes to proposed Rules instead of the above listed major changes.

Thank you for making the full text of this NPRM widely available through your Internet WWW server. I appreciate the opportunity to comment on this proceeding.

Submitted by:

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President

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