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Radiotechniques

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28 February 1994

Mr. William Caton
Secretary, Federal Communications Commission
1919 M. Street, NW
Washington, DC 20554

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Dear Mr. Caton:

Enclosed please find an original and fourteeen copies of Radiotechniques Engineering Corporation's reply comments in *An Inquiry into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification*. MM Docket Number 93-177.

Please enter these reply comments into the record, and distribute them as required.

Respectfully submitted

Edward A. Schober, PE

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Before the
Federal Communications Commission
Washington, DC 20554

In the Matter of

An Inquiry into the Commission's Policies and Rules Regarding AM Radio Service Directional Antenna Performance Verification	MM Docket No. 93-177 RM - 7594

Reply Comments of Radiotechniques Engineering Corp.

Radiotechniques Engineering Corp. (herein "Radiotechniques") now submits its reply comments in response to the Notice of Inquiry in the above referenced proceeding. Radiotechniques was an initial commentator in the Notice of Inquiry, and an active participant in the NAB AM Directional Antenna Forum held on January 13, 1994 Radiotechniques joins duTriel, Lundin & Rackey, Inc.; Hatfield and Dawson Consulting Engineers, Inc.; Moffet, Larson & Johnson, Inc.; Suffa and Cavell, Inc.; and Silliman & Silliman (herein "du Triel") in their reply comments, with a few minor exceptions.

Radiotechniques believes that the rule changes proposed in du Triel are representative of the consensus of the practitioners in the art of directional antenna adjustment and verification who were present at the NAB forum. These changes are completely in accord with the present state of the art and prudent policy making. It is essential that changes embodying the principles of the du Triel comments be put into effect as soon as possible. The early enactment of these regulation changes will encourage good engineering practice and proper adjustment of directional antennas, thereby providing the benefit of reduced interstation interference and compliance with regulation.

Separate Comments of Radiotechniques

Radiotechniques believes that there are several additional areas that are not discussed in the du Triel reply comments that should be studied at further length. This further study should not inhibit the timely enactment of the regulation changes proposed. The Commission should however keep the proceeding open, or expect to revisit this area. 1) Within a few years, experience gained with novel antenna configurations that under the rules as contemplated by du Triel will be classified as "Category B" will allow these antenna structures as "Category A"

2) The sideband characteristics of directional antennas will be a critical specification for Digital Aural Broadcasting in the Medium Frequency Band. Radiotechniques believes that "transmitter per tower" schemes will be the preferred method of carrying out digital transmission in this band. The concept of "Common Point" will need to be reviewed in the future.

3) Radiotechniques continues to believe that Category B field measurement ratios should be corrected for near field effects as Radiotechniques originally proposed (and corrects in the attached appendix).

4) Radiotechniques believes that measurements at substantially less than the distances specified in du Triel's comments are acceptable, provided near field correction is used.

5) Radiotechniques continues to believe that statistical methods should determine the confidence level of the Category B measurement ratios. If a high

confidence level is achieved, as few as five points could be used or as many as the ten proposed by du Triel if the confidence level is low. (See Radiotechniques comments.)

6) We believe it is premature to specify a single Electromagnetic Code as acceptable.. Identifying MININEC III as of sufficient accuracy is appropriate. It is also important that the maximum acceptable size of segments in terms of wavelength and percentage of length of the element be specified. These maximum acceptable segment sizes may be different for field calculation and impedance calculation.

7) Karl Lahm's "detuned current antinode" loop placement may be a superior monitoring method. Further experimentation may show that this may be the best location for loops, and it may be desirable to specifiy this location for all new construction on towers over 110 degrees in height if further experimentation validates his research. Karl Lahm's measurement of power distribution to each element is a very effective diagnostic and confirmation of proper operation. Commercially available equipment is not available to use this otherwise useful method at this time.

8) The du Triel reply comments may include some typographical or oversight errors. This is to be expected in as voluminous proceeding as this:

a) an array including non-vertical radiators should be "Category B"

b) Tolerances for impedance measurement in the du Triel reply comments shown as ± 4.0% and 2.0 Ohm should be ± 4.0% or 2.0 Ohm whichever is larger.

c) Common point resistance is only required to be measured if power is measured by Common Point Current.

Conclusion

Radiotechniques believes that the changes proposed in the du Triel reply comments will greatly relieve the difficulties stations have in complying with current regulations. It will allow many stations to decrease operating expense, while better assuring that they do not cause interference to other stations. These changes should be put into force as soon as possible.

The exceptions in this document are primarily to alert the Commission that the elimination of antiquated restrictive regulation will invite the development of new technologies. The Commission should be prepared to revisit this area within a few years.

Radiotechniques Engineering Corp.
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Edward A. Schober

Appendix A

Analysis of Data: (Revised and Corrected)

Unattenuated field shall be determined by the following procedure:

Measure the nondirectional and directional field intensity at each of five radial points on each radial from the antenna system. The radials shall be drawn from the reference non-directional antenna.

Excess attenuation is the difference in measured field intensity from that which would be produced by inverse field attenuation using the evaluated field the non-directional radiator.

Calculate the near field at the distance and direction from the reference tower for infinitely conducting plane earth in microVolts. Add in quadrature, a term equal to the standard pattern "Q" value adjusted for inverse square distance. Convert the result to dbμ V. Subtract the excess attenuation above inverse distance attenuation for each point from the dbμ V value above. Ratio the measured value of field intensity at the point (in dbμ V) with the calculated value.

Repeat this process for each measured point on the radial. Take the antilog of the average of these ratios. If the standard deviation of the antilog of the individual ratios divided by the standard pattern field is less than 0.1^2, then the evaluated unattenuated field on the radial is equal to the standard pattern unattenuated field times the antilog of the average ratio.

If the standard deviation exceeds 0.1^2 then there may be inadequate data to evaluate the unattenuated inverse field. This may be due to the scattering effects of reradiating structures, or variations or other effects. More measurement points should be evaluated to a maximum of ten.