Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
Amendment of Part 15 of the Commission's	)	
Rules To Establish Regulations for Tank Level	)	
Probing Radars in the Frequency Band	)	
77-81 GHz	)	ET Docket No. 10-23
	)	
and	)	
	)	
Amendment of Part 15 of the Commission's	)	
Rules to Establish Regulations for Level Probing	)	
Radars and Tank Level Probing Radars in the	)	
Frequency Bands 5.925-7.250 GHz, 24.05-	)	
29.00 GHz and 75-85 GHz	)	

Reply Comments of the Measurement, Control & Automation Association

The Measurement, Control & Automation Association (MCAA) files these reply comments in response to the Commission's Further Notice of Proposed Rulemaking in the above-captioned docket.[1]

A. ABOUT MCAA

MCAA is the national trade association representing leading manufacturers and distributors of instrumentation, systems, and software used in industrial process control and factory automation around the world. Members include the leading multi-national companies, together with a range of niche-oriented providers.

The association was founded in the 1940s as Recorder-Controller, Inc. and subsequently became associated with the Scientific Apparatus Makers Association (also known as the SAMA Group of Associations). MCAA was incorporated under its current name in 1994.

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[1] *Tank Level Probing Radars in the Frequency Band 77-81 GHz*, Further Notice of Proposed Rule Making, 27 FCC Rcd 3660 (2012) (*Further Notice*).

A list of members appears in Appendix A.

B. THE LEVEL PROBING RADAR INDUSTRY SHOWS NEAR-UNIFORM AGREEMENT ON NEEDED RULES.

All of the Level Probing Radar (LPR) companies that filed first-round comments agree with MCAA in supporting the Commission's broad approach as set out in the *Further Notice*.

Several commenters further agree with MCAA that the Commission should deregulate the antenna beamwidth of LPRs installed inside tanks, at least as to tanks whose materials will shield receivers outside the tank from the effects of the wider beamwidth.[2] Several commenters, along with MCAA, favor the Commission's making available an expanded 6 GHz frequency range inside attenuating tanks, either through the continued application of Section 15.209 or otherwise.[3]

MCAA renews its request for the Commission to incorporate these elements into the adopted rules.

C. MCAA DOES NOT OPPOSE VARIATIONS ON THE PROPOSED RULES SUGGESTED BY OTHER LPR ENTITIES.

MCAA does not oppose the following proposals put forward by other LPR interests:

- expanding the 6 GHz frequency range to 5.460-7.250 GHz for in-tank LPRs under proposed Section 15.256;[4]
- setting boresight limits for 6 GHz in-tank LPRs that are consistent with *in situ* equivalent average reflected emissions of -41.3 dBm, rather than the proposed -55 dBm/MHz;[5]

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[2] Emerson at 2; Krohne at 6-7; Magnetrol at 2; Siemens Canada at 2; Sutron at 1-3 (outdoor LPRs over water); VEGA Americas at 2.

[3] Emerson at 2, Krohne at 3-4; Magnetrol at 2; Sutron at 3 (outdoor LPRs over water); VEGA Americas at 2.

[4] Krohne at 3-5. MCAA's request to maintain the applicability of Section 15.209, if granted, might meet Krohne's needs for a wider bandwidth.

- compliance testing of in-tank LPRs using representative tanks;[6]
- specifying a 35 degree antenna beamwidth for over-water applications only, over a 5.650-7.25 GHz frequency range;[7]
- clarifying that an LPR can be moved between locations, if operated only when fixed;[8]
- adopting antenna specifications no more restrictive than in the *Further Notice*, so as to accommodate planar antennas;[9] and
- incorporating average and peak power calculations into the rules.[10]

Hach Company also requests that the LPR rules distinguish between "harmonic emissions from digital circuitry used to enable the operation of the transmitter," on the one hand, and "unwanted digital emissions from circuitry used to control the functions and capabilities other than the operation of the transmitter," on the other.[11]

Hach requests a limit for harmonics of the transmitter fundamental at 20 dB below the fundamental emissions, similar in principle to the harmonic limits in Sections 15.245(b) (10 and 24 GHz bands) and 15.249(a).[12] This proposal would subject LPRs to more stringent standards at 6 GHz, relative to the proposal in the *Further Notice*, but would relax the out-of-band limits at 26 and 80 GHz:

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[5] Krohne at 5.

[6] Krohne at 6.

[7] Sutron at 1-3.

[8] YSI Inc. at 3-4.

[9] Hach Company at 5-6.

[10] Hach Company at 6-7.

[11] Hach Company at 7-8.

[12] Hach Company at 8. A pulse train having a very low duty cycle, which is typical of LPRs, has multiple harmonics whose amplitudes are relatively high.

Frequency Band (GHz)	Fundamental Limit (dBm/MHz)	*Further Notice* Out-of-Band Limit (Sec. 15.209) (dBm/MHz)	Hach Proposed Limit on Harmonics (dBm/MHz)
5.925-7.250	-33	-41.3	-55
24.05-29.00	-14	-41.3	-34
75-85	-3	-41.3	-23

Table 1
Hach Company Proposed Limits on
Harmonics of Fundamental Emissions

MCAA is concerned that the Hach proposal may needlessly alarm spectrum users at multiples of fundamental frequencies in the 26 GHz LPR band. (Multiples of the 80 GHz band are not presently in use.) Moreover, the antenna characteristics at frequencies very far removed from the design frequency may be unpredictable. Although MCAA does not oppose the Hach proposal, we think its potential impact needs careful study before adoption.

D. MCAA SUPPORTS SOME REQUESTED MEASURES TO PROTECT RADIO ASTRONOMY

In its first-round comments, MCAA agreed to the following measures requested by radio astronomy interests:

- adoption of paragraph 16 of the *Further Notice* (proposing to require a dedicated or integrated antenna, professional installation in downward position, fixed locations, and prohibition of hand-held applications and marketing to residential consumers);[13]
- an exclusion zone of 4 km around identified radio astronomy sites;[14] and
- a 15 meter height limit within 40 km of identified radio astronomy sites.[15]

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[13] National Academy of Sciences' Committee on Radio Frequencies (NAAS/CORF) at 4.

[14] NAS/CORF at 6; National Radio Astronomy Observatory (NRAO) at 3. A list of the sites that MCAA consented to appears in our first-round comments at 4.

[15] NAS/CORF at 6; NRAO at 3.

MCAA opposed "line of sight" protection for certain radio astronomy sites at 6650-6675.2 MHz[16] because we are unsure what that protection would entail in practice. NRAO has now withdrawn that request, rendering the question moot.[17]

MCAA continues to oppose requests for a database of installed sites.[18] Many installations are performed by third-party companies, so the manufacturers have no reliable mechanism for maintaining location data. MCAA particularly opposes a publicly accessible database,[19] as it would disclose competitively sensitive customer information. And we continue to believe that the measures to which MCAA consents, listed above, should make actual incidents of interference to radio astronomy extremely rare, if they occur at all, so that in practice a database would have little or no utility.

E. DELPHI AUTOMOTIVE OVERSTATES THE LIKELY INTERFERENCE FROM LPRS.

Delphi Automotive, in *an ex parte* filing, raises a concern about the proposed sidelobe gain specification at -10 dBi.[20] Its concerns relate solely to the 80 GHz band. Delphi calculates that an antenna producing an 8 degree beamwidth at 100% antenna efficiency corresponds to an antenna gain of 29 dBi.[21] The -10 dBi sidelobe requirement, says Delphi, means the sidelobe

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16 NRAO at 3.

17 Reply comments of NRAO at 2 (filed June 20, 2012).

18 NAS/CORF at 4-5; NRAO at 3.

19 NAS/CORF at 5; NRAO at 3.

20 Delphi Automotive at 1-2, commenting on 47 C.F.R. § 15.256(i) (proposed). Delphi also raises issues that relate to other proceedings affecting parts of the 80 GHz band, *id*. at 2-3, but which have no place in this docket.

21 Delphi Automotive at 1. The Commission proposes to require a maximum half-power beamwidth of 8 degrees at 75-85 GHz. 47 C.F.R. § 15.256(h)(2) (proposed).

must be 39 dB below the main lobe level. At the main lobe maximum of -3 dm/MHz, the sidelobe would then produce -42 dBm/MHz, just under the Commission's estimated level of -41.3 dBm/MHz.

The problem, says Delphi, comes at lower antenna efficiencies. Taking 10% efficiency as a "very pessimistic worst case example," it puts the main lobe gain at 19 dBi; with the same side lobe limit of -10 dBi, the side lobe is only 29 dB below the main lobe.[22] A main lobe level at -3 dm/MHz then corresponds to a sidelobe emission of -32 dBm/MHz, or about 10 dB higher than the estimated level. Delphi asks that the sidelobe power emissions be "specified and verified."[23]

Delphi's analysis is badly distorted by its use of an unrealistic 10% antenna efficiency.

For a given beamwidth, and holding all other properties constant, the gain of an antenna (as a numeric value) is directly proportional to its efficiency. Redoing Delphi's calculation, but with a more realistic low-side efficiency of 60%, gives a gain of 26.8 dBi, a sidelobe that is 36.8 dB below the main lobe, and a sidelobe emission of -39.8 dBm/MHz. This is just 1.5 dB above the FCC's estimate of -41.3 dBm/MHz. At 80 GHz, which is subject to both high free-space attenuation and high attenuation from terrain and ground clutter, a 1.5 dB difference in emissions is not significant.

Nevertheless, MCAA has no objection to the Commission's measuring the sidelobe gain as part of the certification process, so long as the measurement ascertains gain, as specified in the proposed rules, rather than sidelobe emissions, which are not specified.[24]

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[22] Delphi Automotive at 2.

[23] *Id*.

[24] 47 C.F.R. § 15.256(i) (proposed).

F. MCAA OPPOSES EIBASS'S REQUESTS AS BEING BOTH UNNECESSARY AND OVERLY BURDENSOME.

Engineers for the Integrity of Broadcast Auxiliary Services Spectrum (EIBASS) seeks multiple protections for Broadcast Auxiliary Service operations at 6,425-6,525 and 6,875-7,125 MHz: built-in circuits to block operation of an LPR unless it is stationary and pointed downwards within 10 degrees of vertical; installers required to hold Society of Broadcast Engineers, Inc. certification at the broadcast engineer level or higher, or certification by the National Association of Radio and Television Engineers as an EMC Engineer, or Professional Engineer registration; and records of when and by whom each installation took place, with the installer's qualifications in each case.[25]

These are all solutions to a nonexistent problem.[26]

EIBASS defends its requests by characterizing the proposed power increase for LPRs "by almost three orders of magnitude," from -21.3 to +7 dBm. But EIBASS neglects to mention that these are peak levels. The increase in permitted *average* EIRP levels is just over 8 dB. Moreover, and importantly, all of these values apply to the boresight measurement of a downward-pointing antenna. Predicted average emissions at 6 GHz in other directions are -55 dBm, or 13 dB *below* the general emissions limits for unlicensed devices.

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[25] EIBASS at 2-4.

[26] Moreover, we disagree with EIBASS's assertion that the Commission lacks authority to prohibit the marketing of LPRs to residential consumers and, more generally, that the Commission lacks jurisdiction over the advertising of approved Part 15 devices. EIBASS at 4. Congress granted the Commission authority over marketing in Section 302 of the Communications Act, 47 U.S.C. § 302(a), and the Commission implemented that authority in Section 2.803 of its rules. We have no doubt that the Commission can regulate the advertising of a device certified for limited applications, where the advertising specifies applications not covered by the certification.

EIBASS is particularly concerned about interference into studio-to-transmitter links. Those links, however, are installed high off the ground and use highly directional receive antennas, making received interference from LPRs highly unlikely. Indeed, none of the myriad other 6 GHz fixed service users or providers has expressed any concern over the *Further Notice*. And MCAA is not aware of any interference problems arising from Section 15.250, which allows average levels 13 dB higher than those predicted from LPRs in the same 5925–7250 MHz band, using generally similar modulations.

EIBASS offers no reason to doubt that the professional installers required under proposed Sec. 15.256(b) will comply with Commission rules. Nor does EIBASS explain how the various alternative installer certifications it requests—none of which requires any expertise in LPRs—would improve the rate of compliance. Unless and until the proposed requirement for professional installation proves to be inadequate, the Commission should not layer on additional and irrelevant qualifications.

In short, EIBASS has not presented any evidence of problems that would justify the expensive and cumbersome measures it seeks.

CONCLUSION

The Commission should promptly adopt the rules proposed in the *Further Notice*, with the modifications put forward by MCAA and other LPR industry participants.

Respectfully submitted,

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Appendix A – List of MCAA Members

ABB Instrumentation Division
Acromag Inc.
Ametek Calibration Instruments
Ashcroft Inc.
Automation Products Group, Inc.
AW-Lake Company
Azbil North America, Inc.
Badger Meter
Berthold Technologies
Branom Instrument Company
Bronkhorst USA Inc.
Brooks Instrument
Burkert Fluid Control Systems
Burns Engineering Inc.
Cameron Measurement Systems
Carotek Inc.
CENTRO, Inc.
Compass Controls & Instrumentation Inc.
ControlAir Inc.
Control Management
Cross Company
Daitron Inc.
Dave Ray & Associates
DocBoss
Dwyer Instruments Inc.
DynaTech Control Solutions
Emerson Process Management
Emerson Power & Water
Emerson Process Systems
Endress+Hauser, Inc.
Engineered Sales Co.
Extrel CMS
FasTest Inc.
Festo Corporation
Fisher Controls International LLC
Flowmaster Inc
Fluid Components International
Fluid Flow Products Inc.
Forberg Scientific, Inc.
Gems Sensors & Controls
Georg Fischer Signet LLC
GF Piping Systems
Gilson Engineering Sales Inc.
Great Plains Industries Inc.
Hach Company
Ham-Let North America
Hawk Measurement
Heartland Controls
Hile Controls of Alabama
Hoffer Flow Controls, Inc.
Honeywell International
Instrumart
Instruments Direct
Invensys Operations Management
IPT Group
Ives Equipment Corporation
IWAKI America Inc.
Kessler Ellis Products Co.
K-Patents Inc.
Krohne Inc.
Lesman Instrument Co.
Magnetrol International
Martel Electronics Corporation
McCrometer, Inc.
Meriam Process Technologies
Metso Automation
Micro Motion Inc.
Mid-West Instrument
Miller Energy, Inc.
Miller Mechanical Specialties Inc.
Mitsubishi Electric Automation
Monitor Technologies, LLC
Moore Industries-International, Inc.
Mueller Sales Corp.
Palmer Wahl Instrumentation Group
Pepperl + Fuchs Inc.
Petro-Chem Equipment
Phoenix Contact Inc.
PR Electronics
Precision Digital Corporation
Precision Fitting & Gauge Company
Process Controls Corp.
ProComSol, Ltd.
Pyragon, Inc.
Pyromation Inc.
R. Stahl Inc.
Racine Federated
Red Lion Controls
Regal-Brown, Inc.
Reotemp Instruments
Ritec Enterprises Incorporated
RJ Global WIKA, LLC
Robert S. Hudgins Company
Rockwell Automation
Rosemount Analytical Liquid Division
Rosemount Flow Division
Rosemount Measurement
Rosemount, Inc.
Rust Automation & Controls Inc.
Schneider Electric, Telemetry & Remote SCADA Solutions
Siemens Industry Inc.
Sierra Instruments, Inc.
Sierra Monitor Corporation
Smart Sensors Inc.
Smith Instrument
SOR, Inc.
SpectraSensors Inc.
Spirax Sarco Inc.
Sterling Engineering Solutions
StoneL
TALON Technical Sales
Teledyne Hastings Instruments
Tel-Tru Manufacturing Company
Thompson Equipment Company, Inc.
Thuemling Instrument Group Inc.
Transcat
Ultra Electronics, Nuclear Sensors & Process Instrumentation
UWT Level Controls LLC
Valin Corporation
VEGA Americas, Inc.
Venture Measurement Company LLC
V-F Controls, Inc.
VorTek Instruments
WIKA Instrument Corporation
Wilson-Mohr Inc.

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