

ARRL EMC Committee Semi-Annual Report

Doc. #

**For The
American Radio
Relay League**

**Board of Directors Meeting
July 14-15, 2006**

**Submitted By
Dennis Bodson, W4PWF
Chairman, ARRL EMC Committee**

Mission Statement:

The EMC Committee monitors developments in the Electromagnetic Compatibility (EMC) field and assesses their impact on the Amateur Radio Service. The Committee informs the ARRL Board of Directors about these activities and makes policy recommendations for further action, if appropriate.

The overall goals of the committee are:

- Advise the ARRL Board about issues related to radio-frequency interference
- Advise the ARRL HQ staff on the content of its publications
- Make recommendations to the ARRL Board and HQ staff

Members of the Committee:

- Dr. Dennis Bodson, W4PWF, ARRL Roanoke Division Director, EMC Committee Chairman
- Mr. Mike Gruber, W1MG, ARRL Lab RFI Engineer, HQ Staff Liaison
- Mr. Jody Boucher, WA1ZBL, RFI troubleshooter, Northeast Utilities
- Mr. Ed Hare, W1RFI, ARRL Laboratory Manager
- Mr. Ron Hranac, N0IVN, Board of Directors, Society of Cable Telecommunications Engineers
- Mr. Steve Jackson, KZ1X, VDSL and wireless communications
- Dr. Ron McConnell, W2IOL, T1E1.4 VDSL Standards Committee
- Mr. Cortland Richmond, KA5S, EMC Engineer
- Mr. Mark Steffka, WW8MS, Automotive EMC engineer
- Mr. Walt Stinson, W0CP, Former ARRL Rocky Mountain Division Director
- Dr. Steve Strauss, NY3B, Home Phone Networking Alliance Technical Committee
- Mr. Hugh Turnbull, W3ABC, ARRL Honorary Vice President

HQ Staff:

The role of the ARRL HQ staff consists of the following:

- Answer individual inquiries from hams (and sometimes their neighbors) about RFI problems
- Write and publish articles about RFI
- Write and publish the ARRL RFI Book
- Design and update ARRL's RFI web pages
- Maintain a database at ARRL to facilitate EMC case tracking and reporting
- Work with ARRL's D.C. office on various spectrum and RFI-related filings
- Maintain contact with industry
- Participate in standards and industry groups. This includes ANSI C63, Society of Automotive Engineers EMC and EMR committees, Home Phone Networking Alliance, VDSL, HomePlug, FCC and individual companies.

Mr. Gruber handles the majority of the staff work on EMC matters. In the 1st half of 2006, continued working with a volunteer towards developing a library of RFI sound recordings, which is on the ARRL's web site. Several products have also been informally tested for conducted and radiated emissions, with informal help from an EMC Lab in the Boston area. The results of this testing will be used to help better appreciate the emissions levels of some Part 15 products.

First Half 2006 Year Total RFI-case statistics:

New RFI Cases – 203

New electrical power-line cases – 72

- ARRL Letters sent – 15
- FCC 1st Letters sent – 6
- FCC 2nd Letters sent – 4

EMC/RFI-related emails Total - 1759

Electric Utilities:

Power-line interference has continued to be the single number one interference problem reported to ARRL HQ. These cases are being worked on by HQ staff, in cooperation with Riley Hollingsworth of the FCC. Two cases have now resulted in a field investigation. An official FCC citation was issued by the Tampa Field Office in one of these cases. This citation is believed to be the first of its kind, i.e., one in which an electric utility was cited for interference to an amateur station. Several more power-line noise cases have also been approved for field investigation. *(Although not a case with direct ARRL involvement, Mr. Gruber reports an official FCC warning has also been issued by the Atlanta Field office.)*

The FCC and HQ staff continues to discuss all open cases monthly. Developing a strong case for enforcement action against an offending utility continues to be a primary goal of Mr. Gruber. In addition to the professional grade interference locating receiver (Radar Engineers Model 240) that was purchased to aid in the power-line noise effort, an ultrasonic dish (Radar Engineers Model 250) has now been added to the arsenal. This instrument can be used to pinpoint the offending hardware on a pole once the pole has been located.

Broadband Over Power Line (BPL):

Broadband over power line (BPL) is the use of electrical wiring or power-distribution lines to carry high-speed digital signals. There are two types of BPL of concern to amateurs. Both *in-building* and *access* BPL have signals that occupy most or all of the HF range, extending into VHF. The power-line or electrical wiring can act as an antenna and radiate these signals. In-building BPL can be used to network computers within a building. It uses the building wiring to carry digital signals from one computer to another. Most in-building BPL operates under the HomePlug industry specification. Access BPL provides broadband Internet access to homes and businesses, using a combination of techniques and wiring. Although some BPL feasibility trials have shut down, the number of locations trying access BPL are increasing. In-building applications are also on the rise.

There were a number of developments related to BPL that occurred in the first half of 2006:

- The BPL situation in Manassas, VA has come to a boil. Local amateurs have been filing interference complaints for over a year, with the general response from ComTek, the BPL operator, being that the system is not causing harmful interference. In March, the FCC ordered ComTek to perform certain testing. They did some testing, but ARRL's analysis of their testing showed that it was fundamentally flawed for a number of reasons. In June, the FCC became more firm with ComTek, requiring that they do the testing that the FCC actually ordered and that they resolve the harmful interference. The FCC also asked them to tell the FCC how they would inform their customers if the FCC ordered them to shut the system down. The case is still pending.
- Main.net, the BPL manufacturer whose equipment is being used in Manassas, has established dialogue with ARRL. In June, Main.net's US CEO came to ARRL HQ to meet with Ed Hare and Dave Sumner. It was agreed that ARRL and Main.net staff would meet in Manassas so ARRL could demonstrate the impact of the system on Amateur communications and could discuss any progress made by Main.net at resolving it.
- Other BPL manufacturers, electric utilities and BPL operators have also been working with ARRL. As an example, BPL chipset manufacturer DS2 went to ARRL HQ to demonstrate improvements in the notch depth of their chipset.
- The United Power Line Council, a few days after they had a meeting with FCC staff, removed the restrictions to access to the FCC-mandated BPL database

- The US House of Representatives passed a version of changes to the Telecommunications Act that contained an amendment that would mandate that the FCC study BPL interference and provide a report back to Congress. (ARRL is continuing to work with the Senate to get them to include the same provision.)
- ARRL staff have continued to do presentations on BPL at various Amateur and industry events. Mr. Hare has given presentations on BPL at the Dayton Hamvention; the ARRL Midwest Division convention; at IEEE EMC Society chapter meetings in Massachusetts and NY and at a meeting of the AASHTO frequency coordinators.
- Some in the BPL industry have been similarly reaching out to Amateur Radio. Jim Mollenkopf, the Vice President for Architecture and Products of Current Communications gave a presentation on BPL at the HamCom convention in Texas. Mr. Mollenkopf was very clear that if the Current system that is to be deployed in Texas causes harmful interference, it is his responsibility to fix it.
- One step forward; one step back: Several new BPL systems are coming on line. For example, TXU and Centerpoint in Texas both announced major new deployments that are just starting to be installed as of mid 2006. The good news is that the largest will use equipment manufactured by Current Technologies, a company that, so far, has not seen major interference problems. IDACOMM, a communications spinoff of IDACORP, large western electric utility, announced that IDACOM's abandoning of its BPL interest was going to cost IDACORP shareholders \$10M. The Mitsubishi system in Cottonwood, AZ was shut down, as was the Current Technologies system operated by SMECO in MD. Closer to home, United Illuminating shut down the BPL system it was operating in Shelton, CT.
- Dick Illman, AH6EZ, won the Dayton Hamvention Technical Excellence award for his work in helping Motorola design a BPL system that was designed not to interfere with Amateur Radio.
- Mr. Hare continues to represent Amateur Radio's stake in BPL standards development on various industry committees. These include the IEEE P1775 BPL EMC committee; the IEEE EMC Society Standards Development Committee and ANSI ASC C63™.

ARRL's information on BPL is found at <http://www.arrl.org/bpl>

Automotive EMC:

Mr. Hare continues as the ARRL representative on the Society of Automotive Engineers EMC (Electromagnetic Compatibility) and EMR (Electromagnetic Radiation) Committees. The Headquarters staff continues to send all reports of automotive EMC problems to interested people in the automotive industry. While these reports are advisory, they are helpful to the industry in planning for future designs. Mr. Steffka has completed a rewrite of the automotive chapter in a new edition of the The ARRL RFI Book.

Cable Television:

As a whole, the cable industry continues to do a good job at adhering to the FCC's regulations about leakage and interference. ARRL has received few reports of problems, indicating that most systems are either clean or are addressing complaints effectively. The few cases ARRL has been involved with have been addressed through Mr. Hranac, the cable-industry member of this committee. He generally refers the report to the senior technical management of the involved cable company, who then in turn help the local system resolve the reported problem. All of the handful of cases with which Mr. Hranac has been involved in the last six months have all been resolved satisfactorily.

The ARRL RFI Book:

Mr. Gruber is currently editing and rewriting sections of The ARRL RFI Book for a new edition. The new book is expected to be in printing toward the end of the year.

Four Committee members are rewriting several chapters, and two new chapters are being added:

- Mr. Gruber: Editing all material and writing a new chapter, How to Resolve a Power-Line Noise Complaint. Mr. Gruber is also working with Mr. Hare on a second new chapter concerning general Part 15 consumer devices, and summarizing some key points in the book.
- Mr. Hare: Rewriting the chapter on RFI Standards and Regulations. Mr. Hare is also working with Mr. Gruber on a second new chapter concerning general Part 15 consumer devices, and summarizing some key points in the book.
- Mr. Steffka: Rewriting the chapter on Automobiles.
- Mr. Hranac: Rewriting the chapter on CATV interference. He is also reviewing the chapters on Antenna Television and VCRs.

Two additional authors are not Committee members. Ghery Pettit, N6TPT and Hartley Gardner, are rewriting the Computers and RFI At The Receiver chapters, respectively. Mr. Gardner is also updating the Intermod chapter.

Database:

The ARRL HQ staff maintains a database of RFI reports and cases. This is used primarily as a case-management tool for the several hundred RFI cases ARRL handles every year, but the information the Lab staff are gathering about types of interference cases, involved equipment and frequencies will provide a wide range of reporting capability. Here are some statistics from the database for the 1st half of 2006:

| RFI COMPLAINTS BY SOURCE: | |
|--|------------|
| Power Line Noise | 52 |
| Amateur Radio | 32 |
| Unknown | 49 |
| Appliances & Electrical Devices | 24 |
| Automotive | 14 |
| Computer | 3 |
| Electric Fence | 8 |
| Non-Amateur Transmitters | 2 |
| TV | 7 |
| Medical Device | 5 |
| Cordless Phone | 0 |
| CATV | 4 |
| Street Light | 1 |
| Miscellaneous | 4 |
| | |
| | |
| TOTAL 1st Half 2006 cases: | 205 |

| RFI COMPLAINTS BY VICTIM: | |
|--|------------|
| Amateur Radio | 110 |
| FM & TV | 12 |
| Electrical Device | 12 |
| CATV | 7 |
| Stereo & Intercom | 5 |
| Medical Device (Pacemakers) | 5 |
| Automotive | 10 |
| Telephones | 11 |
| Alarm | 2 |
| Unknown | 3 |
| Cordless Phone | 2 |
| AM Broadcast Radio | 3 |
| Computer | 9 |
| TV | 9 |
| Miscellaneous | 5 |
| | |
| | |
| TOTAL 1st Half 2006 cases: | 205 |

Committees:

ARRL continues to be represented on professional EMC committees. Messrs. Bodson and Hare continue to represent the interests of Amateur Radio on the ANSI ASC C63™ RFI committee. Mr. Hare is the ARRL C63™ representative; Dr. Bodson is the alternate. Mr. Hare serves as the chairman of Subcommittee 5, Immunity. Mr. Hare also chairs the C63 committee's ad-hoc working group on power-line communications devices. This continues to be a hot topic of discussion at the C63 meetings.

The C63 committee is working on developing industry standards for immunity, emissions and testing of electronic devices. ARRL serves as a resource to the committee to protect the interests of Amateur Radio. Subcommittee 1 continues to work on a variety of EMC projects, primarily related to test site standardization. Subcommittee 5 deals with immunity and immunity measurement issues. Subcommittee 8 deals with various types of medical equipment. The ARRL EMC-Committee representation on C63 watches immunity and testing developments.

Mr. Hare was also appointed to serve on the IEEE BPL-standard committee, serving on its EMC Working Group. He was also appointed to serve on the IEEE EMC Standards Development Committee, where he chairs their BPL/PLC study project.

ARRL also continues its participation in the Society of Automotive Engineers EMC and EMR Committees. Mr. Hare is the ARRL representative on those committees. Mr. Steffka also serves on the committees, representing his employment in the automotive industry.

The Future of EMC and Amateur Radio:

Interference to hams appears to be the present major work of the committee. Although immunity problems still do occur, this is being addressed at the national and international standards level. RFI from unlicensed devices poses a major real threat to Amateur Radio at this time. This will continue to require significant Committee and ARRL staff attention. To the extent possible with existing staff, or with additional resources, the ARRL should increase its contact with standards organization, industry groups and individual companies, and continue to work on all aspects of RFI problems and solutions.

ARRL's information about RFI can be read at <http://www.arrl.org/tis/info/rfigen.html>.