

## **WESTERN WASHINGTON COOPERATIVE INTERFERENCE COMMITTEE**

### **WWCIC ENGINEERING STANDARD #6 REV. C (02-97)**

#### **FOR RADIO TRANSMITTING AND RECEIVING DEVICES AND FM BROADCAST**

All communications fixed transmitter installations shall employ isolators or alternative techniques meeting the same criteria to minimize spurious radiation and intermodulation products. Additional filtering may be required according to frequency and interconnect devices as listed below. As the industry progresses, superior devices may be available and installed.

#### **The following engineering standards will be observed:**

Transmitters in the 29.8 to 54 MHz range shall have a low pass filter, band pass filter or cavity providing a minimum of 30 dB attenuation removed 1.0 MHz from the operating frequency.

Transmitters in the 66 to 88 MHz range shall have at least 25 dB of isolation followed by a band pass cavity providing at least 20 dB of attenuation 1.0 MHz removed from the operating frequency.

Transmitters in the 88 to 108 MHz range operating at a power level of 350 watts or less shall have at least 25 dB of isolation followed by a band pass cavity providing at least 35 dB of attenuation 1.0 MHz from the operating frequency.

Transmitters in the 88 to 108 MHz range at power levels above 350 watts shall have a band pass cavity providing at least 25 dB of attenuation 1.4 MHz from the operating frequency.

Transmitters in the 130 to 225 MHz range shall have at least 50 dB of isolation followed by a low pass filter and band pass cavity with a minimum of 15 dB of attenuation 1.0 MHz removed from the operating frequency.

Transmitters in the 400 to 470 MHz range shall have at least 50 dB of isolation followed by a low pass filter and band pass cavity with a minimum of 15 dB of attenuation 2.0 MHz removed from the operating frequency.

Transmitters in the 806 to 990 MHz range shall have at least 50 dB of isolation followed by a low pass filter or a band pass filter with a minimum of 15 dB of attenuation 10 MHz removed from the operating frequency and 40 dB of attenuation at 20 MHz.

A band pass cavity/filter or crystal filter is recommended at the input of all receivers. Its purpose is to protect against RF energy "off frequency" from mixing in a non-linear device such as the first RF amplifier in a receiver which can re-radiate causing interference.

The band reject duplexer (cross notch duplexer) may not be used without the use of cavities or isolators.

Single braid coax cable is prohibited. Double shielded cable must have over 98.5% shield coverage. Single braid cable with resistive terminations is acceptable ONLY as a fixed method for relative signal strength measurements.

Jacketed coaxial cable is required. Unjacketed transmission line of any type is prohibited.

Use of N, TNC, DIN or other types of constant impedance connector is preferred over a non-constant impedance type. Effort should be made to prevent the use of coax adaptors.

All equipment is to be grounded. Grounding is to be done with low impedance conductor to the station ground grid, preferably with flat copper strap or heavy braid. The "green wire" of the AC power plug is not an acceptable grounding point. The site manager has the responsibility of providing a suitable ground for users.

Transmitting systems must be checked periodically, which includes the isolator, VSWR on the load port of the isolator and overall system insertion loss.

Bare metallic ties are prohibited for securing transmission lines to towers. In the case of large lines, use of stainless steel or galvanized hangers is permitted. Hardware capable of rusting and dissimilar metals are prohibited.

Transmission lines are to be insulated from metallic structures/objects. It is the duty of installation personnel to prevent "diode junctions" from taking place.

All loose wire or metal objects are to be removed from the tower and site. Metal fencing should be plastic coated.

All equipment shall be licensed and operated in full accordance with all applicable rules and regulations of the regulating agency, (FCC, NTIA). There shall be no modifications which violate "FCC Type Acceptance."

It is recommended that all equipment be labeled with the owner's name and a current 24- hour telephone contact number, (service agency is acceptable).

Every effort should be made to protect the equipment from lightning damage. Feed-through lightning protectors should be used on all coaxial cable connections to equipment enclosures. Gas, Gap, MOV and Silicone Avalanche Diode (SAD) protectors should be used in control, audio, telephone and power connections.

## **INTERFERENCE POLICY STATEMENT**

In the event Radio Interference (RI) occurs, all users of the site are required to participate in solving the problem by providing technical personnel and test equipment to locate the source of the specific problem. If these standards are complied with, additional isolators, filters, cavities, etc. may be required. All equipment must be maintained in good working order and meet original manufacturer's and FCC specifications for reduction of transmitter spurious radiation. In the event radio interference (RI) occurs, and these standards are complied with, additional isolators, filters, cavities, etc. may be required to correct specific problems.

Involved systems not in full compliance with these standards will be asked to comply immediately at their own expense.

It is customary for the offending transmitter owner/operator to finance the required corrections or equipment necessary to correct the problem. It is also good practice to allow the affected receiver owner/operator to provide the necessary equipment (if one so chooses) for installation by the offender without surrendering ownership of the equipment and expect its use to be uninterrupted, i.e., not taken out of service without notifying the owner.

The PCS industry is developing the 2.0 Ghz band. It is unknown at this time what interference may be expected or caused and what products will be available for interference mitigation. Policies and standards will be developed by this committee as needed.

These are minimum standards of good engineering practice in the operation and maintenance of electronic sites. These standards will be revised as deemed necessary by the committee.