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## ***TECHNICAL NOTE #15 : CAMPUS AM ANTENNA SYSTEMS***

In 1990 LPB applied to the FCC for a rules change that would allow Campus Antenna Systems (Adopted 11/16/90 FCC Gen Docket 87-839). A number of college stations have been looking for a way to broadcast AM signals without the need for Carrier Current coupling. When the FCC adopted these changes to Part 15, they allowed more options for a campus radio station.

While the FCC permits use of an AM vertical antenna system on college campuses, they are very restricted. Due to the requirement for the AM signals, and the installation requirements for an antenna system, these systems are best suited for larger rural campuses. Careful design is needed in order to meet the FCC requirements and offer maximum coverage on the campus.

### **◆ What are the Rules?**

First a bit of technical details since AM broadcasts on a campus are measured by different formulas under FCC Rules. FCC Part 15.221(a) stipulates that Carrier Current systems are allowed a field of 15 microvolts per meter at a distance of  $(47,715/\text{Frequency})$  meters from the electrical wiring. The measurements mean that Carrier Current systems get their best coverage at the lower end of the AM band (530kHz).

The AM Antenna Systems are regulated under Part 15.221(b) to a field of  $(24,000/\text{Frequency})$  microvolts per meter at a distance of 30 meters from the campus border. Technically, this formula favors the low end of the band also, but the size of the antennas dictate that the best performance is at the higher end of the band (1610kHz).

A second AM Antenna System option exists under Part 15.219 for 100 milliwatt transmitters. This is ONLY for AM transmitters, despite the widely misinformed folks on the Internet claiming it's an FM rule as well. These systems also perform best at the high end of the band, and suffer from no limitation on field strength or campus perimeter. For an urban campus, or small suburban campus, this makes a great option.

### **◆ What's The Big Deal?**

Broadcasting using an antenna offers an advantage over Carrier Current as it can reach large open areas, commons, sports fields, etc., where Carrier Current might not. They are also relatively inexpensive. The standard LPB AM Antenna Package (including transmitter) is \$1795.00. The AM-2000 (100mW) package is the same price. Carrier Current systems often cost about \$1200.00 per building covered, and are designed for indoor coverage.

Antenna systems offer a single point of maintenance and control for the campus, much like a commercial station. They offer wide area coverage and are not as difficult to set up as Carrier Current. Depending on the location and parameters, these systems can cover dozens, even hundreds of acres for a very small cost.

### **◆ Okay, So What's the Bad News?**

AM antennas work best at the opposite end of the band from Carrier Current systems. Changing one to match the other compromises coverage for at least one of them. If you already have a carrier current system, don't go through the expense of retuning all of your existing gear to match up with one antenna system. Changing a Carrier Current System to the high end of the band, generally, results in poor coverage and a lot of unnecessary expense. We can retune, and recrystal, but you hurt the coverage inside your buildings. If you don't have a station, great! This means you have no compatibility problem to worry about.

The main problem with AM Antenna Systems is that their field strength has to taper off by the time you reach the nearest campus border, so the overall field has to stay low. This means that a lot of building structures will prevent it from penetrating. Typical campus construction has lots of steel and reinforced concrete, both of which knock AM signals down to the point that most students won't be able to listen in their rooms. Older buildings with wood and brick construction are not usually a problem, unless loaded with wire lathe. We suggest that you maintain both kinds of systems if you want both indoor and outdoor coverage.

If you have no station now, start with the antenna (it's cheaper) and add the Carrier Current as building coverage is determined.

◆ **So, Why Not Dump Our Carrier Current?**

By keeping the Carrier Current equipment and adding an Antenna to your system you get the best of both worlds. You keep your interior coverage and you add better coverage outside. The drawback is that you need to keep them on different frequencies to get the best coverage. Besides, you already own it, why scrap it?!

◆ **What's The Solution?**

In an ideal world you would be able to put both the antenna and the carrier current on some mid-band frequency such as 800AM and get pretty good coverage out of both. By connecting the antenna to an already existing transmitter on campus (usually with a splitter) you are able to reduce heterodyne interference between the signals. This allows the systems to co-exist, and reduces the chance of problems and costly system changes.

As we know, this is not an ideal world. You may be able to find a good mid-band frequency, but you still have to go through the expense of retuning all of the Carrier Current equipment.

◆ **But I Only Want to Cover a Couple of Miles**

So does everyone else. Sorry but this isn't legal, despite what you may read on the Internet. You need a license.

◆ **Where Can I Find Out More?**

You can visit our website at [www.lpbinc.com](http://www.lpbinc.com) for information on the systems and to download additional technical notes. Visit the FCC website at [www.fcc.gov](http://www.fcc.gov) and check out their many low power pages and rules details. Several organizations also supply information on campus broadcasting – The Intercollegiate Broadcast System (IBS) may be found at [www.ibsradio.org](http://www.ibsradio.org) and the Collegiate Broadcasters Inc. (CBI) can be found at [www.collegebroadcasters.org](http://www.collegebroadcasters.org).

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