



## Tips 'n Tricks: 05-04-2011


[Talk to Sales  
GET A QUOTE](#)

[Sign up for  
Our Newsletter](#)

[Visit our  
eStore](#)

[Send to  
a Friend](#)


### Shields up! by Jeff Welton

Last issue, we discussed grounding as a means of lightning protection. This time around, it's time to talk about that tried and true (and frequently underutilized) friend, the ferrite toroid. The principle is quite simple – if you have two (or more) conductors passing through a ferrite, such that the net sum of their currents is zero, then the ferrite is an inert object, just sitting there waiting for something to happen. If, as in the case with a surge or lightning strike, the current on any conductor increases, such that the net current is no longer zero, then the ferrite core saturates, creates a magnetic field and attempts to induce an equal and opposite current flow in the other conductor(s) – in effect, trying to maintain the zero net total current.

Jeff Welton, has worked with Nautel for 24 years. He is currently the Nautel Sales Manager for U.S. Central Region but previously he spent 16.5 years as a Nautel Customer Service Technician.

For this reason, ferrites are a very good tool in many ways – not the least of which is lightning protection. Used on a coaxial cable going out to the antenna system, they can also be useful for finding ground loops. If you have a ground loop, such that not all of your return current is through the coax shield, the ferrite will saturate – and quickly (depending on the amount of the imbalance between feed and return) get physically warm... in extreme cases, I've even seen them explode!

Submissions for this Tips 'n Tricks column are encouraged and if published you'll receive a Nautel T-shirt. Submissions should be typed and emailed, with high resolution photos, to [info@nautel.com](mailto:info@nautel.com) using the subject line Tips 'n Tricks.

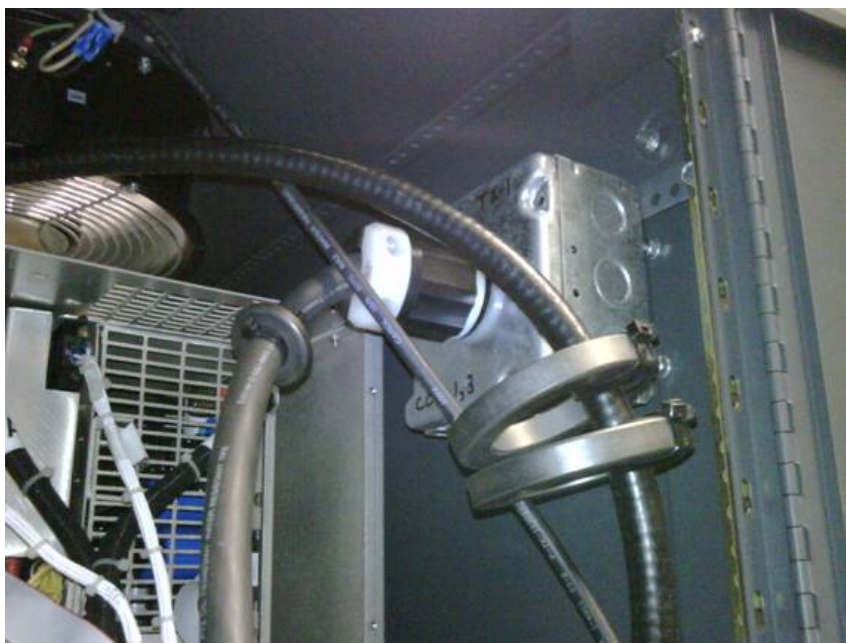
Ferrite toroids are pretty easy to install – you want them at the output of the transmitter, preferably before the point where the coax shield is connected to the station reference ground (usually where the coax enters the building, but not always, so keep an eye out). This photo was taken at a recent NV40 installation outside Chicago (thanks to Art Reis for unwittingly providing the inspiration for this article!).

[Read more Tips n Tricks](#)



In the course of the installation, ferrites can and should be placed on pretty much every current carrying conductor – AC lines, remote control feeds, audio lines (don't forget the STL antenna cable). Nautel provides a handful with every transmitter that goes out the door, to ensure your installation isn't held up for want of some basic protection – talk to your sales rep if you think you need more.

For any cable where there is a safety ground connection (for example, the antenna feedline ground referenced above, or a AC mains surge protector), ensure the ferrites are installed between the ground and the equipment being protected – that makes the reference ground connection look like a better path than the equipment, by raising the effective impedance lighting or surge current has to overcome to get to the equipment.



The above photo is a 1 kW AM transmitter installation – showing ferrite on both the AC and the coaxial cable... ultimately, for the purpose of common mode protection (trying to keep feed and return currents equal), size and permeability are somewhat less important than if we were making a choking by wrapping a single conductor around the toroid.

Another use for toroids is helping to reduce pickup (for example, the RF from your AM station getting onto the audio feed for your FM station). The principle is much the same as for lightning protection – the ferrite will help to filter any signal that is not present in equal amplitudes in both the feed and return paths.

Although I tend to avoid being too commercial in this section, we have several ferrites that can help – and you can order them directly from the [Nautel Store](#). Some useful part numbers are:

- LXP38 – this is a 3/4" inside diameter toroid, good for RF rejection and lightning protection on small signal cables.
- LP23 – a 2-1/8" inside diameter toroid, good for most heavier AC cables and coax up to 1-5/8" (as long as the connectors aren't already installed!)
- LP32 – a 4-1/8" inside diameter toroid, good for the really big AC and RF cables (again, this won't fit over a 3-1/8" EIA flange, so keep that in mind when planning!)
- LA52 – a small (1/4" inside diameter) clip on ferrite that helps to keep higher frequency (FM) RF out of control and signal wiring. Impedance curve shows 320 ohms at 100 MHz, so it wouldn't be so good for an AM station, but definitely useful for a higher power FM.

Wrapping up the pre-NAB issue (I can't believe it's THAT time of year again already!!!), we'll see some of you on the show floor!

Submissions for the Tips 'n Tricks column are encouraged and if published you'll receive a Nautel T-shirt. Submissions should be typed and emailed, with high resolution photos, to [info@nautel.com](mailto:info@nautel.com).

[f](#) [You Tube](#) [in](#)

Select Language

Powered by [Google Translate](#)

**News & Events**  
 Blog  
 Newsletters  
 In the news  
 Events  
 Press Releases

**Access our Resources**  
 Brochures  
 Spec Sheets  
 Customer Stories  
 Webinars  
 Videos  
 eBooks  
 White Papers  
 Presentations  
 Articles

**Visit our eStore**

**nautelpower**  
 Visit Nautel Power for more information on High power, digitally controlled, efficient, RF designs and solutions.

**nautelnav**  
 Visit Nautel Nav for more information on our navigation aids.

**nautel c-tech**

**nautel**  
 Making Digital Broadcasting Work.