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Nautel

TRANSMISSION TALK TUESDAY

Episode #84

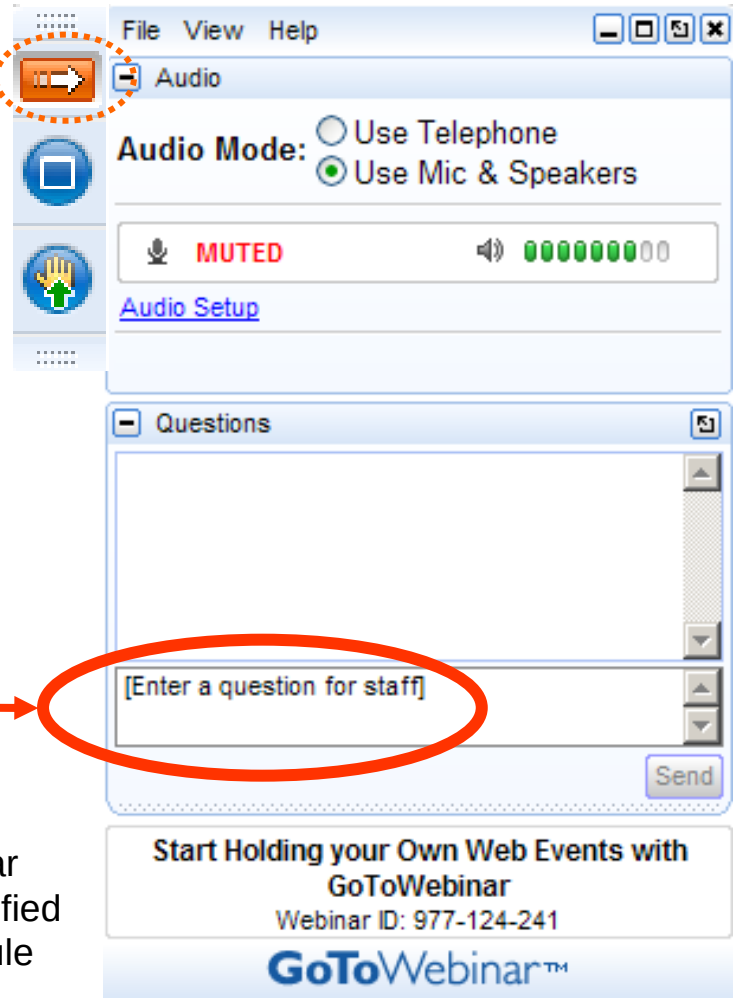
Get Grounded

nautel
AM/FM Radio Transmitters

Your questions please?

(if you don't see the control panel, click on the orange arrow icon to expand it)

Please enter your questions in the text box of the webinar control panel (remember to press send)



Remember: The completion of a Nautel webinar qualifies for ½ SBE re-certification credit, identified under Category I of the Re-certification Schedule for SBE Certifications.

Ideas for things to discuss

- **Grounding**
  - Short and straight
  - How much is too much?
- **New Sites**
  - Planning ahead
  - Staying flexible
- **Ferrites**
  - Why Jeff loves them
  - How they work when used with other things
- **Existing Sites**
  - How to fix them
  - What to look for

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Advance Questions

Any tips for simple measurements between ground points like racks to tx cabinets to rods outside?

Always enjoy Jeff's stories on ground rods, and Toroid's, Question; How do you test your ground system to see if it passes?

Do chemical grounds ever help?

Are there any lightning protectors that can go on the OUTPUT of a tower lighting controller box (feeding the lights)?

What to do about crappy soil conditions? (My site is aptly named "Mica Peak")

Studio grounding also

What should I do with a telecom shack using a ceiling ring wire with four runners in corners going outside to posts

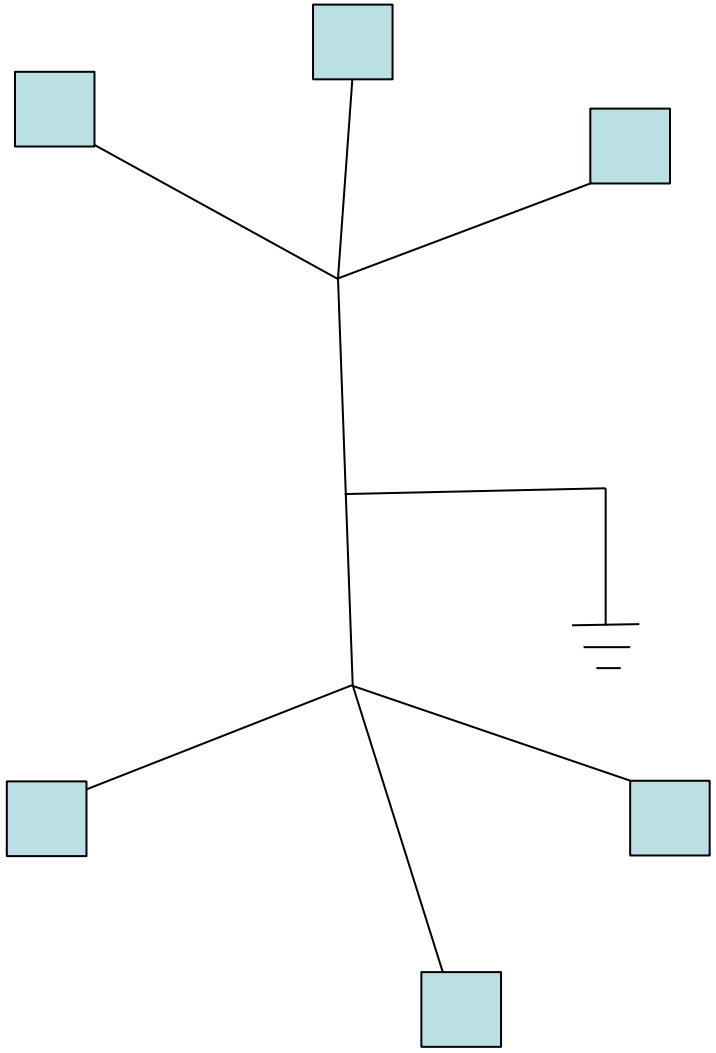
Grounding vs Bonding

- Grounding is WHERE you connect the conductors
  - Ground rods
  - Ground terminals on equipment
  - Earth connections

- Bonding is HOW you connect the conductors
  - Mechanically
    - Clamps
    - Screws
    - Compression connectors
  - Exothermically
    - Brazed, either bronze or Sil-Fos (silver, copper and phosporous alloy)
    - Soldered (whether silver, lead/tin or RoHS compliant)
    - Cadweld

Get Well Grounded…

- But not too well grounded
  - Too many grounds cause issues too.
- Single point (star) grounding is the key
  - One ground per item, where possible.
  - Establish reference ground(s).
  - Use a tree, if need be.



Get Well Grounded…

- Single point ground for racks and individual pieces in a room
- Keeps all audio shields at a common potential
- What's wrong with this picture?

Get Well Grounded…

Buss bar for AC grounds

- Tied to station reference ground
- All primary equipment connected

Bulkhead ground for coax cables

- Best done where cables enter building
- Connected to station reference ground
- Keep ground leads as short as possible

Get Well Grounded…

Equipment Grounding

-Note the ground loop?

-Avoid attaching conduits to cabinet, except at designated conduit entry points

-Black cable shown is an AC safety ground; on a lightning strike, the chassis could become hot.

Get Well Grounded…

MAKE SURE YOUR GROUND CONNECTION IS ACTUALLY GROUND!!!

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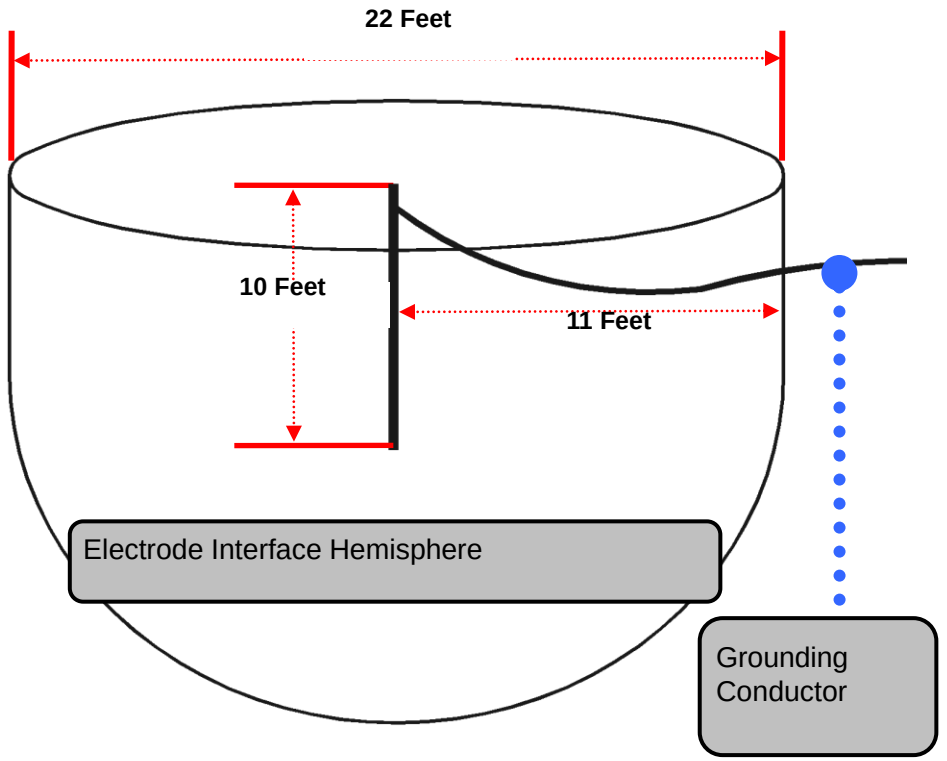
Get Well Grounded…

The best building grounding in the world doesn't help, if it doesn't go anywhere when it reaches the outside world!

Ground Rods

- Penetrate below the frost line
- Moist soil or the water table
- Diameter 3/8” or larger
- Connected with Cad welded or silver soldered copper straps
- Copper or copper clad steel



Keep your Shields UP!

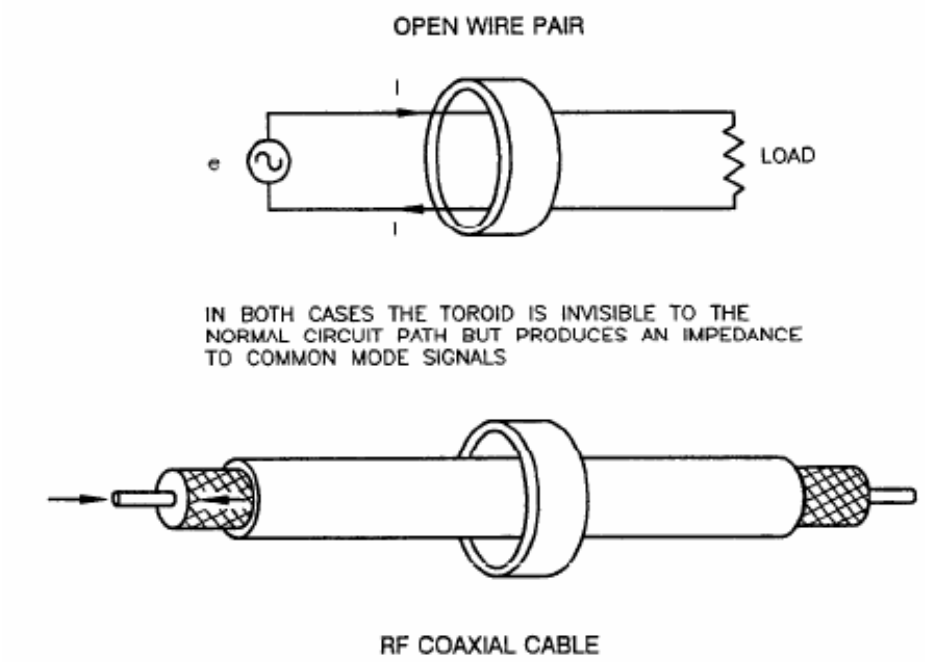


Figure F-4 Use of Toroids to Impede Common Mode Signals

Ferrites are good for reducing common mode signals

-Lightning surges

-Induced RF (especially at co-located AM and FM sites)

-Power line and power supply noise

Keep your Shields UP!

Ferrites on AC cabling can protect against surge related power supply damage

-All feeds and a ground return through the ferrite

-In some cases, such as with purely balanced power supplies, it's desirable to make chokes (wrap each AC conductor around a separate ferrite). In this case, ferrite composition needs to be considered more carefully.

Always Use Protection

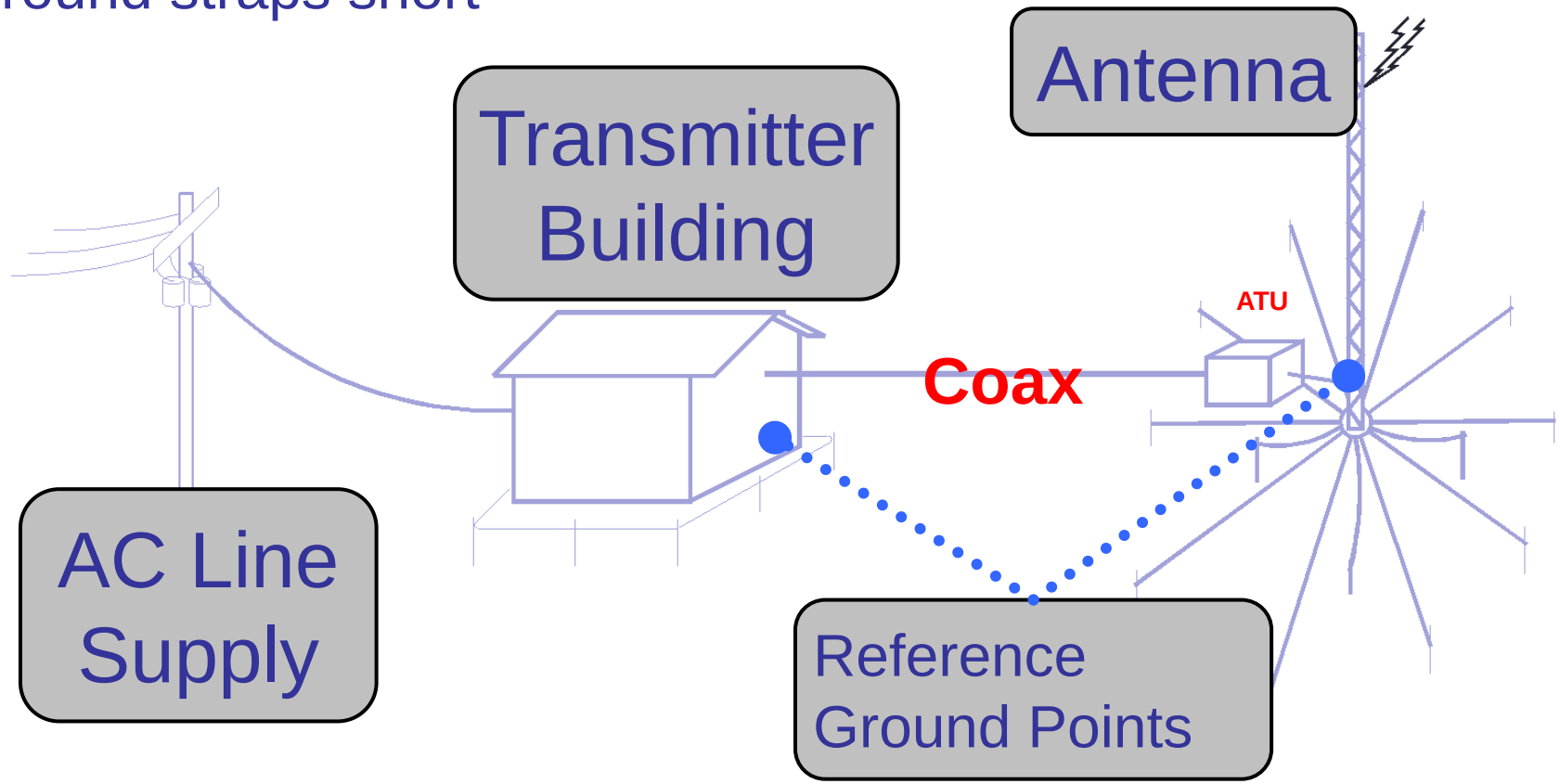
AC Power line protectors are a must – and they
MUST be connected to your station reference ground.

Always Use Protection

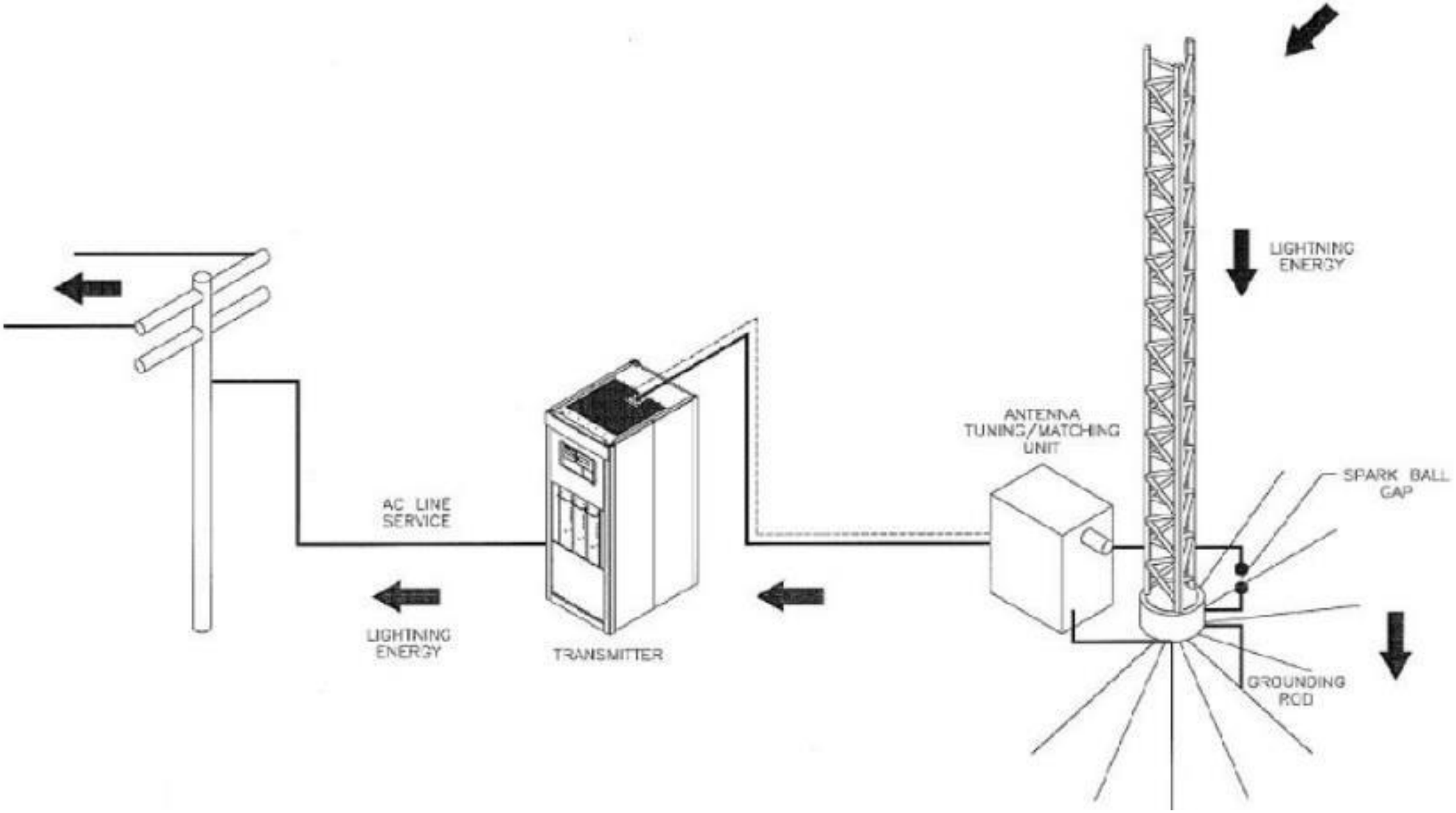
As a minimum, a shunt type MOV protector with fused links (and a solid ground connection!!!) is recommended.

Typical Site

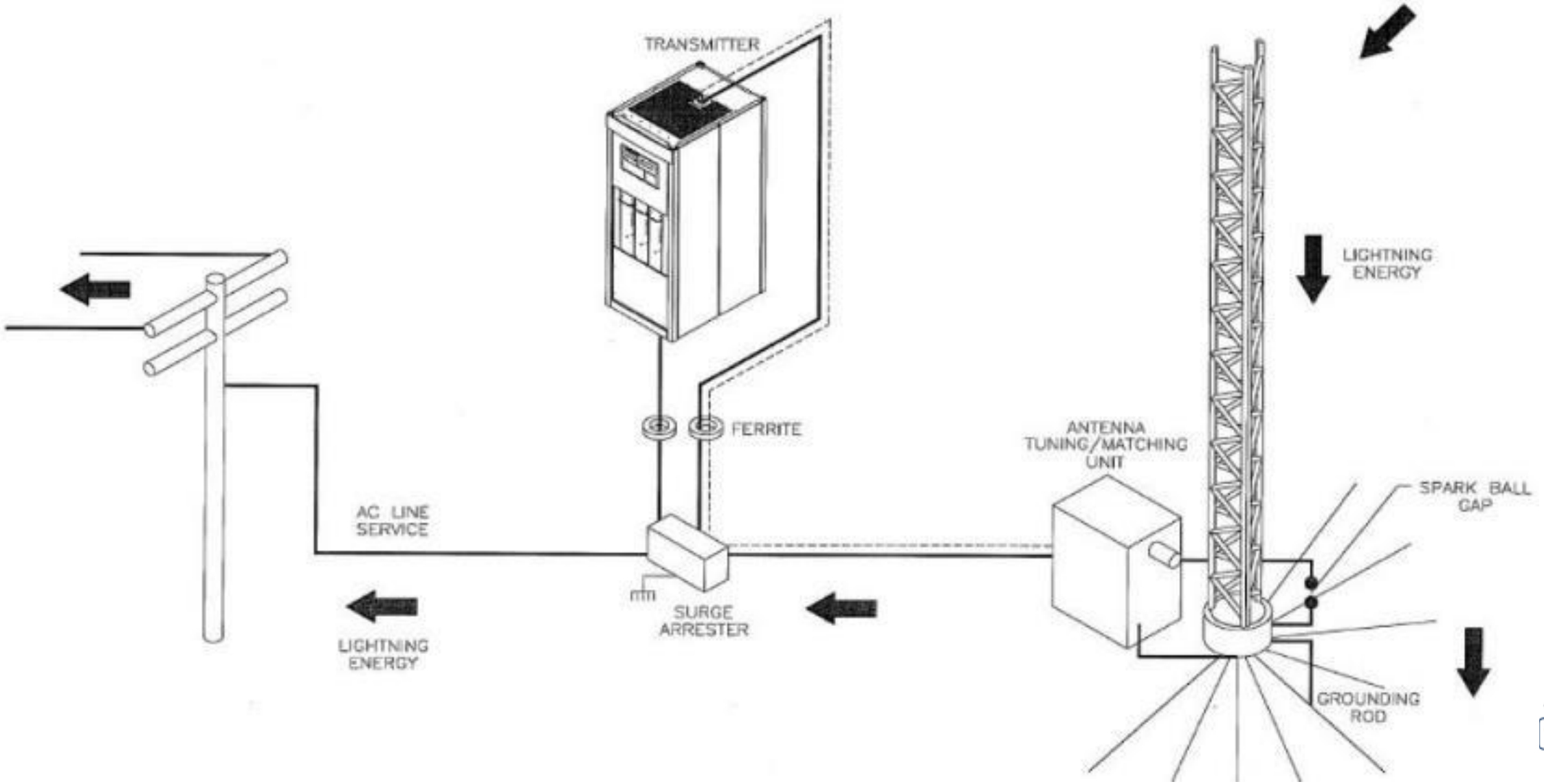
- Try to have AC, coax, and reference ground enter the building in close proximity
- Keep ground straps short



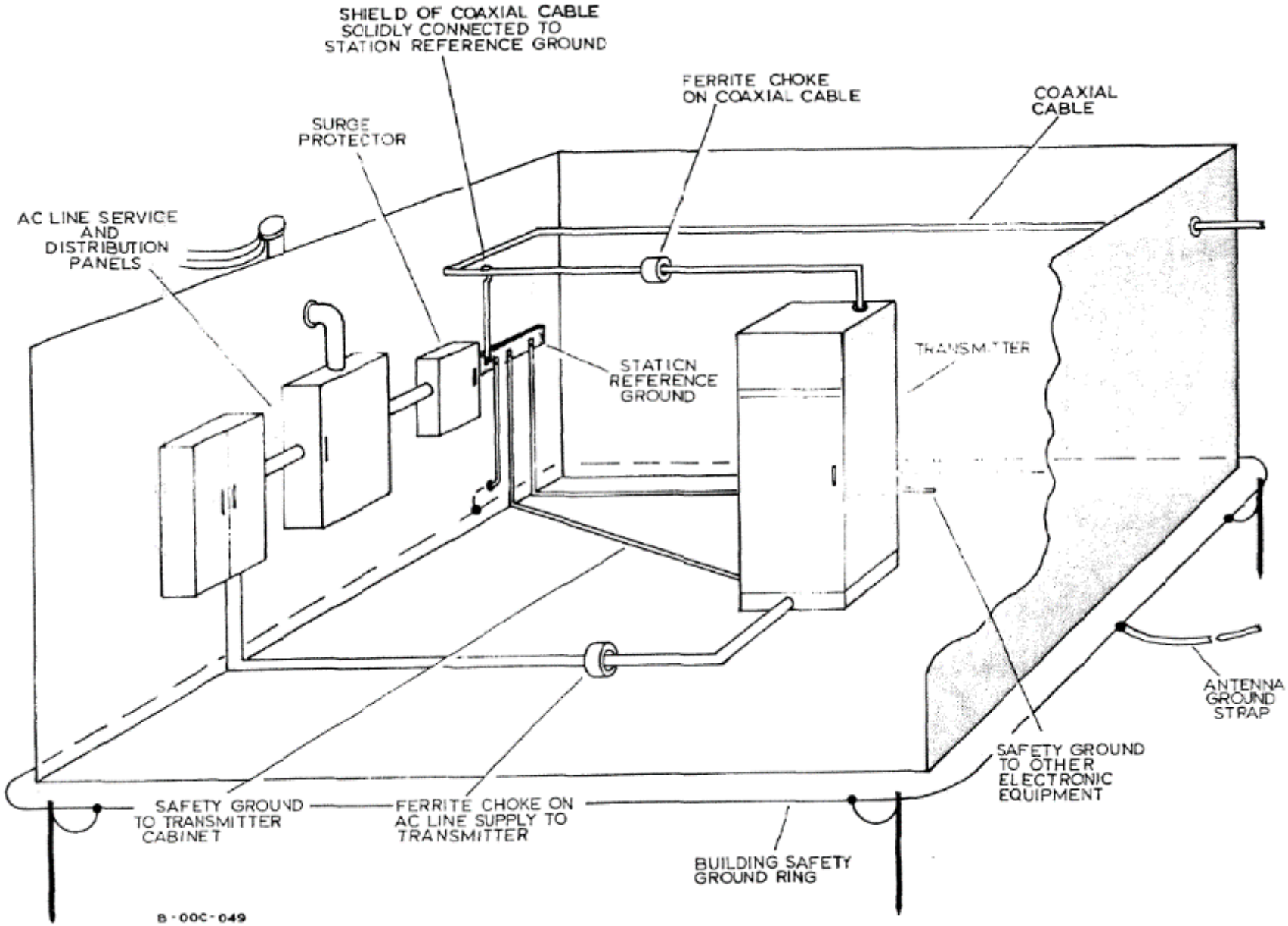
Typical Site



Installation of Surge Protector



Improving Layout



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Resources

https://www.nautel.com/resources/white-papers/site-care/

https://www.rfcafe.com/miscellany/homepage-archive/2015/Motorola-R56-Standards-Guidelines-Communication-Sites.htm

(or Google Motorola R56 standard)

https://www.fluke.com/en-ca/learn/blog/electrical/dont-forget-the-grounding-system

Online Information

Webinars
https://www.nautel.com/resources/webinars/

Nautel Waves Newsletter
https://www.nautel.com/newsletters/

YouTube
http://www.youtube.com/user/NautelLtd

Online Info, such as the Broadcasters' Desktop Resource
https://www.thebdr.net/

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54 years of NAUTEL 1969 2023

THANK YOU!

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