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IEEE 802.3cg Initial Noise Test Setup

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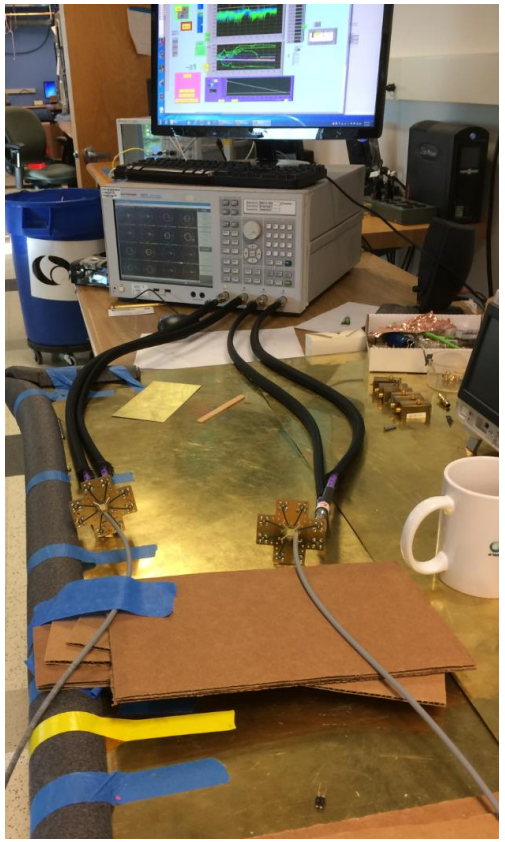
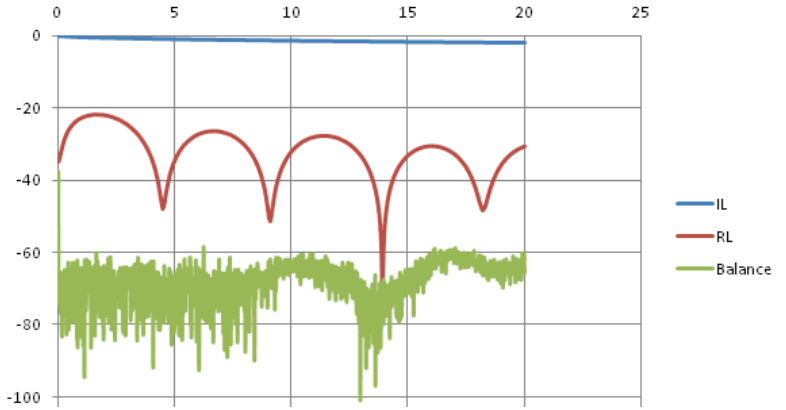
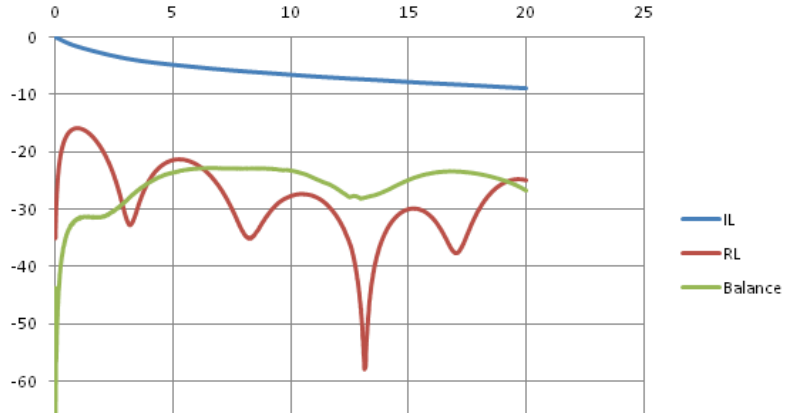
Cable Types Tested:

Two 15 meter samples:





High balance UTP
24 AWG



18 AWG FTP
This required:
Zd = 40 Ω
Zc = 14 Ω

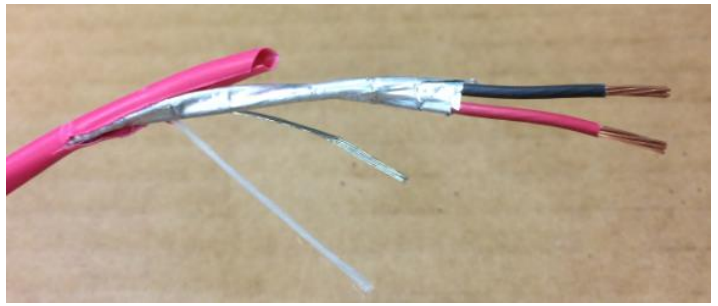
Application Considerations

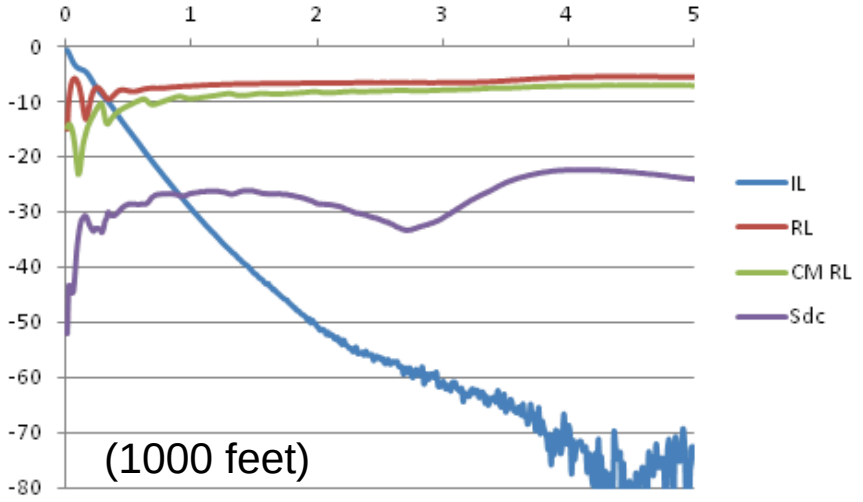
First 18 AWG purchased: COMTRAN (fire sale cable) High (PVC) loss would only reach about 300 ft (if even that - Zd = 40 Ω Zc = 14 Ω)

Profibus standard cables reported to be specified to a wide impedance range: “35 up to 165 Ω” http://control.com/thread/1026186457

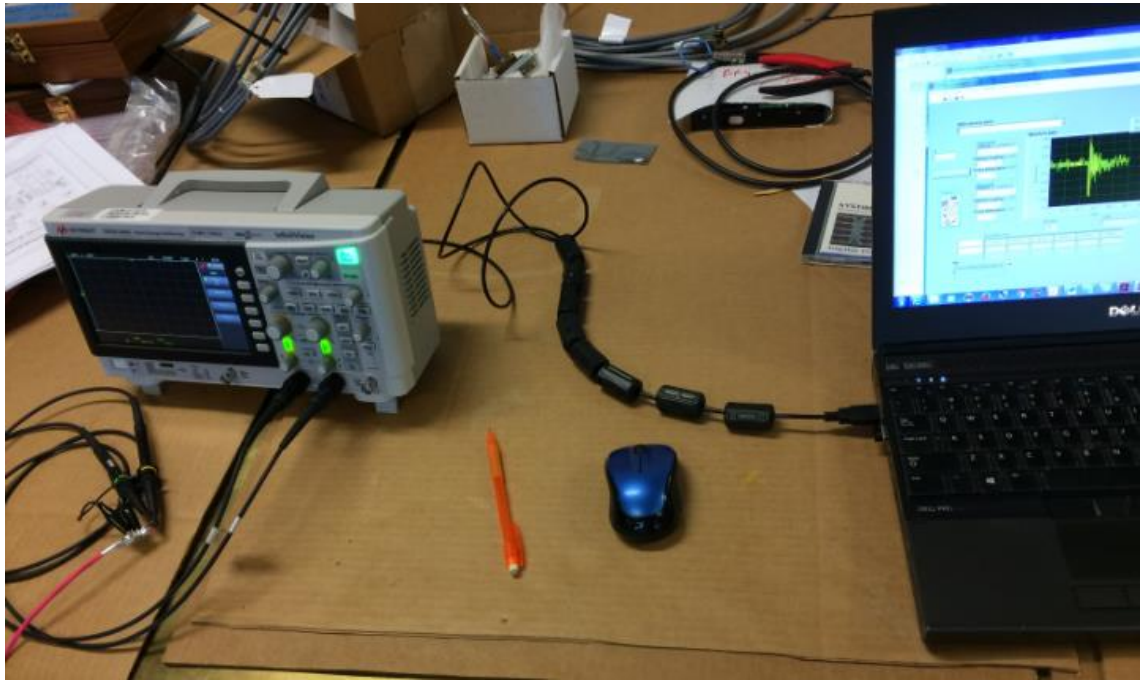
Even tightly specified Fieldbus cable will likely have significant deviations in impedance with spurs and tree configurations

- So how much of installed base really has the high quality linear runs, and/or should this PHY work over a much wider spec range?
- Industrial shielded only or unshielded automotive as well, and maybe office envoronment?



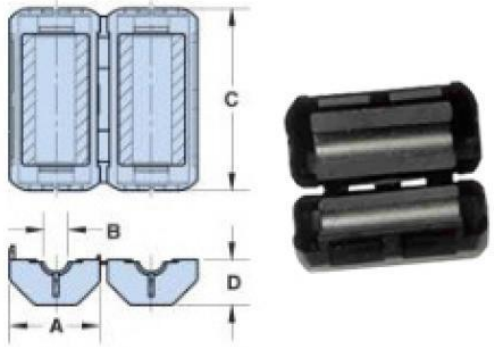


Quick setup to debug software



Found out that some impulses reset the USB link so these ferrites were added:

4 Fair-Rite 0475178281 (75 Material)
4 Fair-Rite 0431178281 (31 Material)

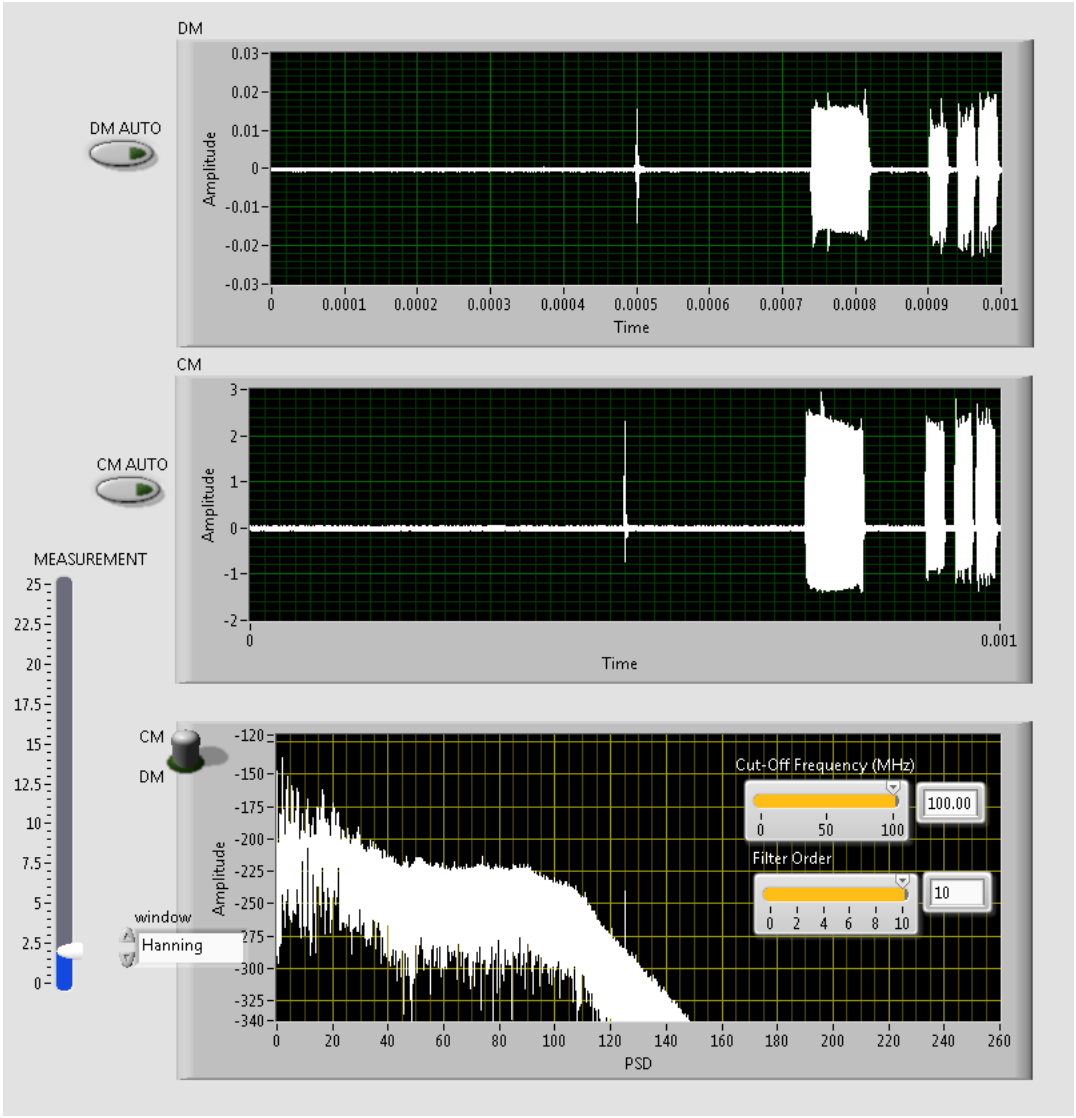


Viewing software with filtering

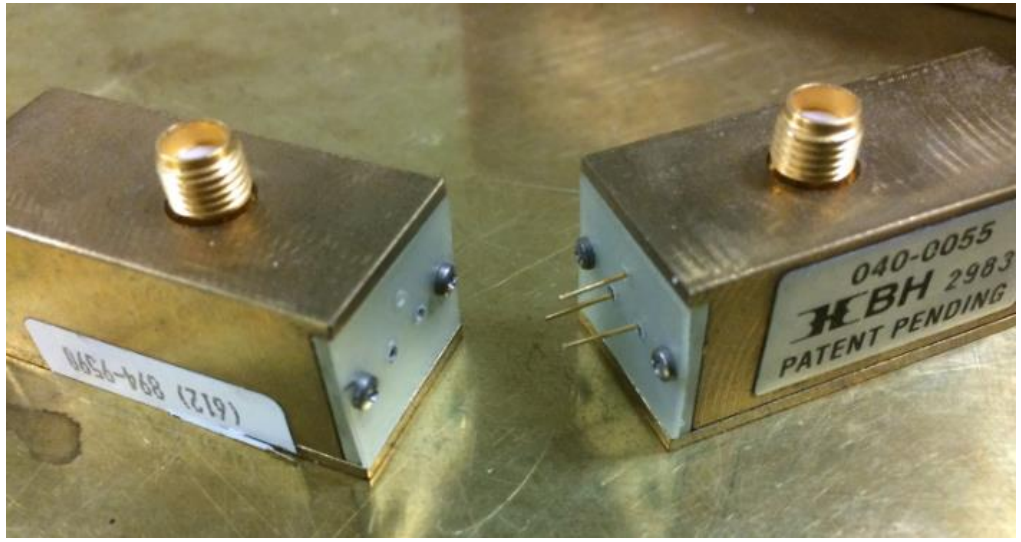
Good to know the spectrum, noise floor and bandwidth in the result while measuring

Staged fluorescent light impulses

Shown here filtered to 100 MHz, but most of the energy in this impulse chain is within a 20 MHz range



Good Quality 3 Port BALUNs



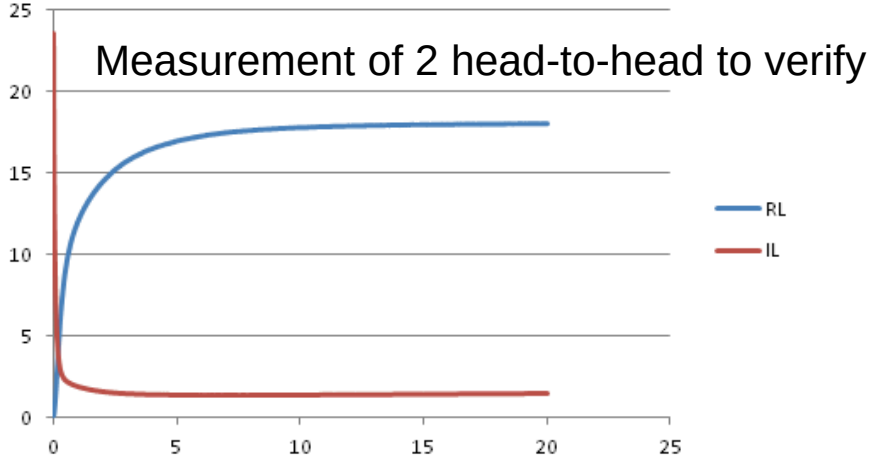
https://www.bhelectronics.com/products/test-baluns.html

Correction:

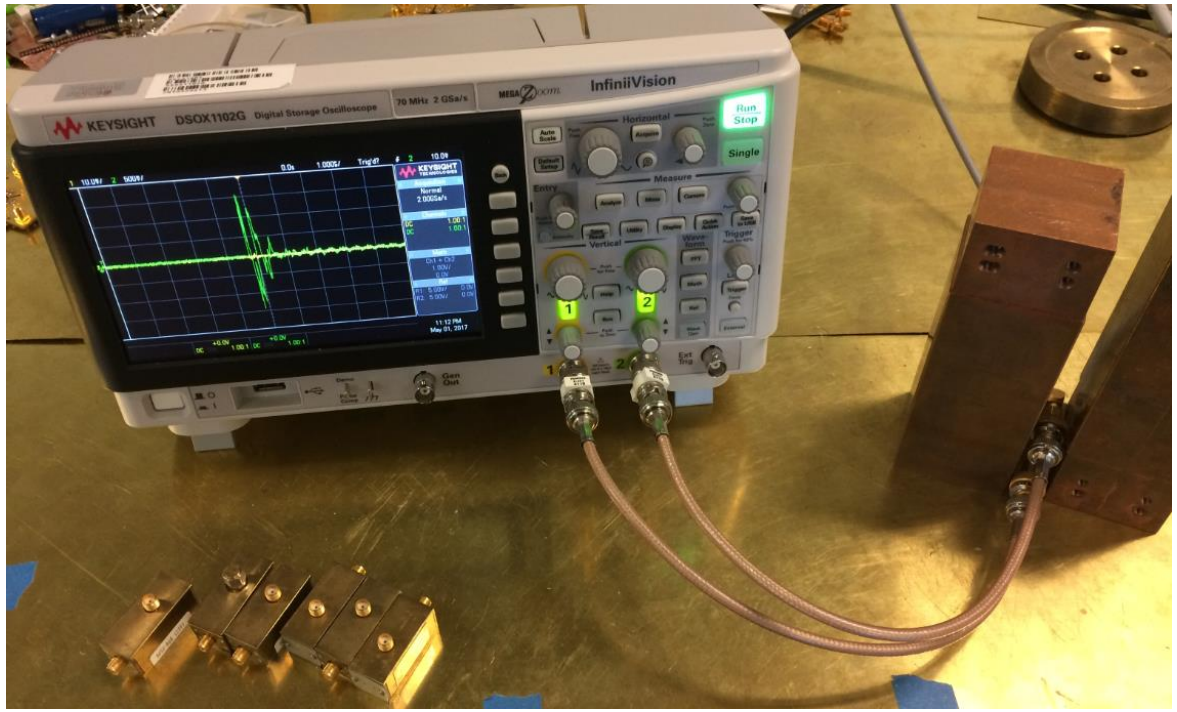
040-0097 has no CM port

~~040-0097 might be the best choice but it has a 16 week lead time~~

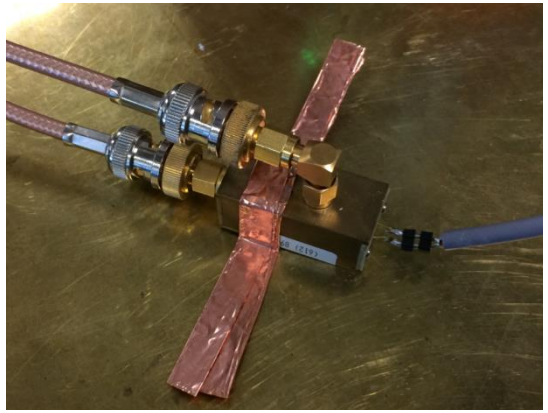
I have a bunch of 040-0055 which work good (60 dB balance but a little weak at the low frequency end



Scope Test Head Arrangement

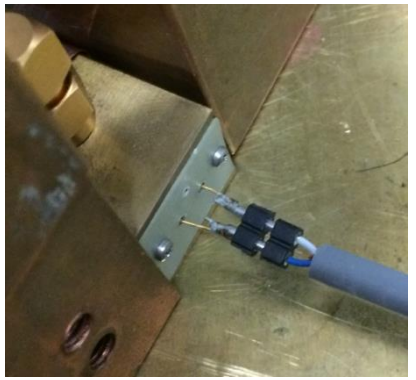


Direct attach with 50 Ω loads



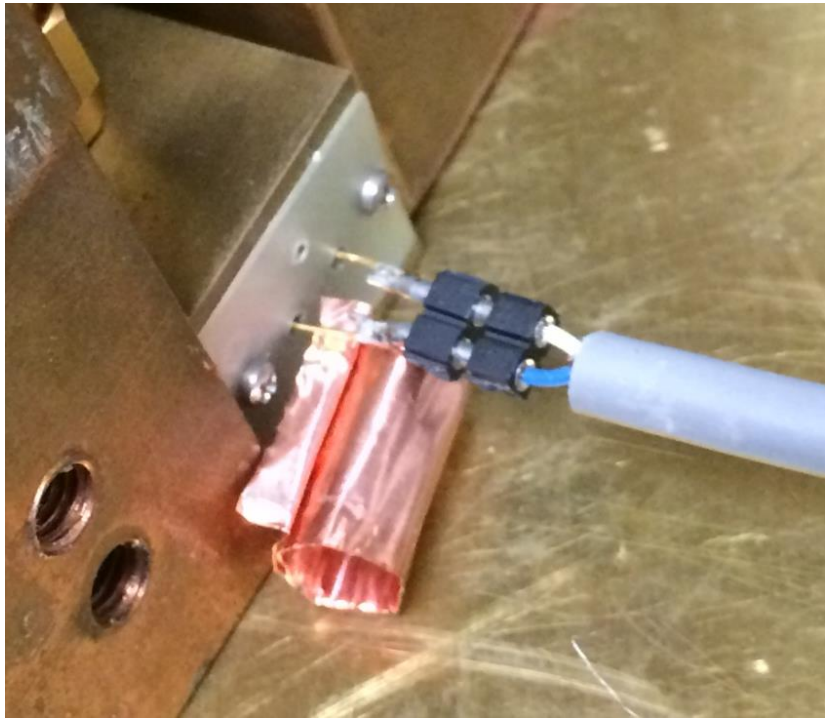
Tight grounding held by weights

Grounding weights for easy manipulation



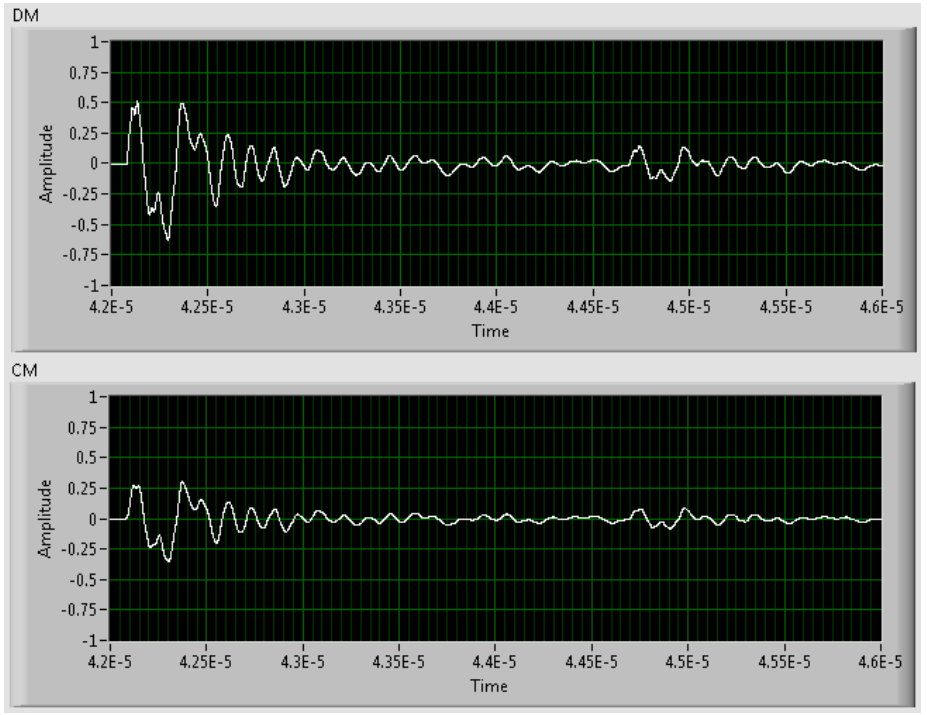
Pin socket attachment

Balance Check Measurement

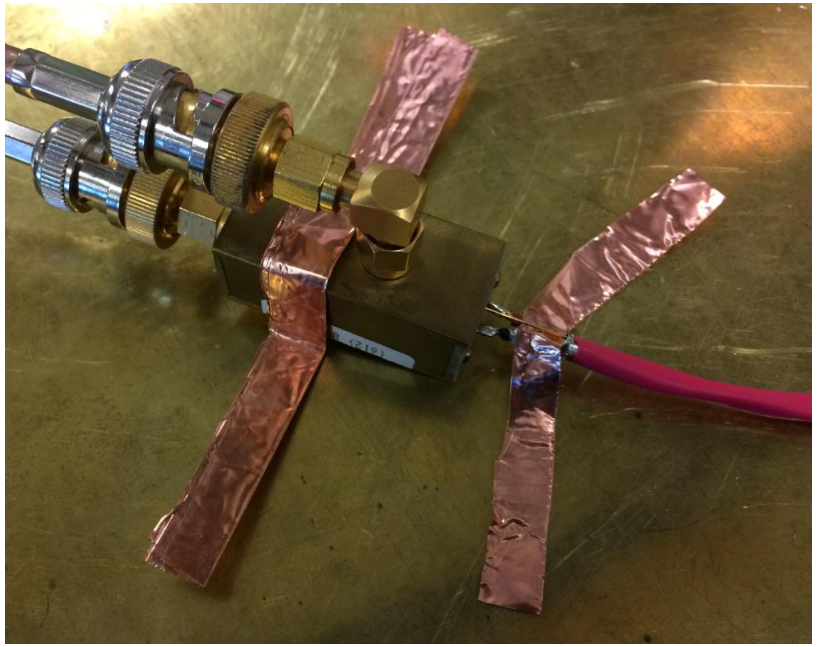


Ground one conductor

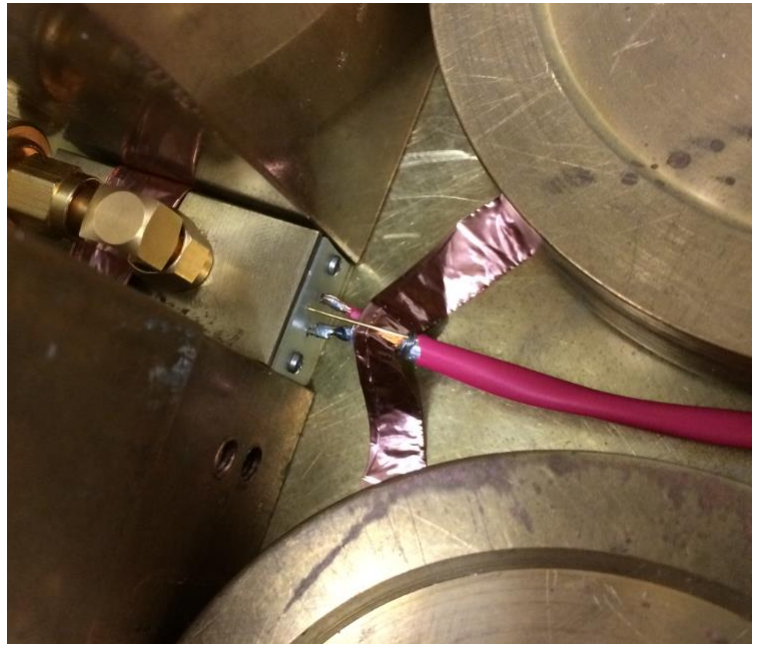
High Balance cable result shows as completely unbalanced



FTP Attachment



Additional shield ground attachment and shield input

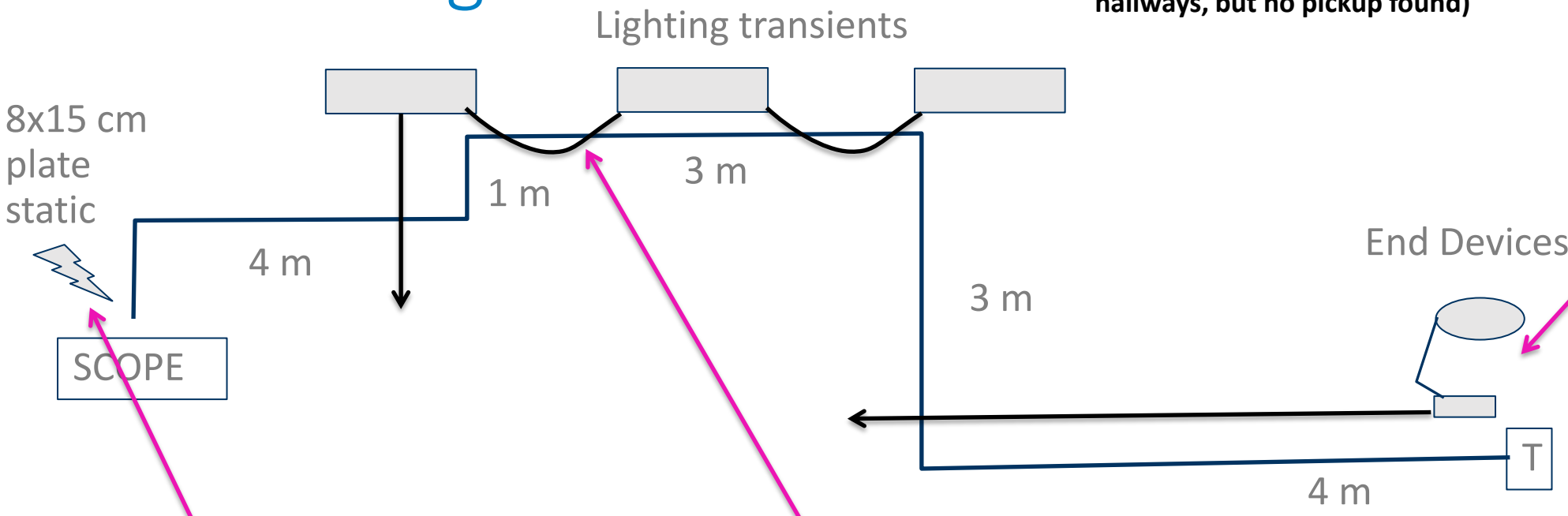


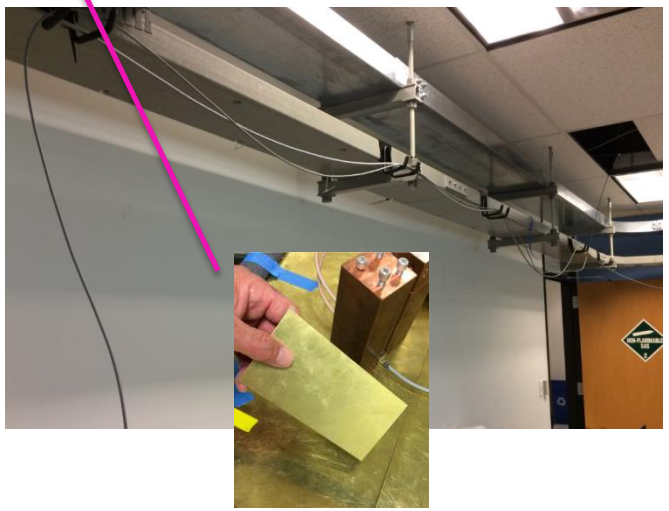
4 grounding weights

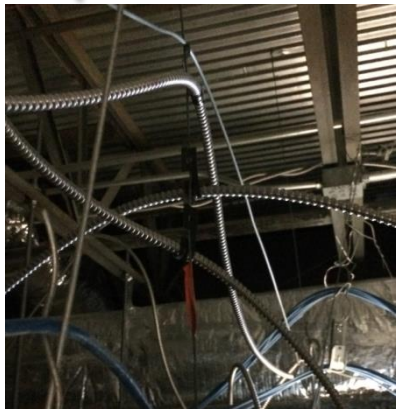
Still a large amount of ingress detected so other attachments must be tried

Cable Routing

(First tried 1000 ft through hallways, but no pickup found)

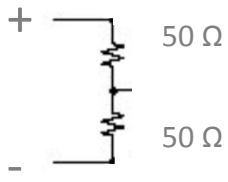


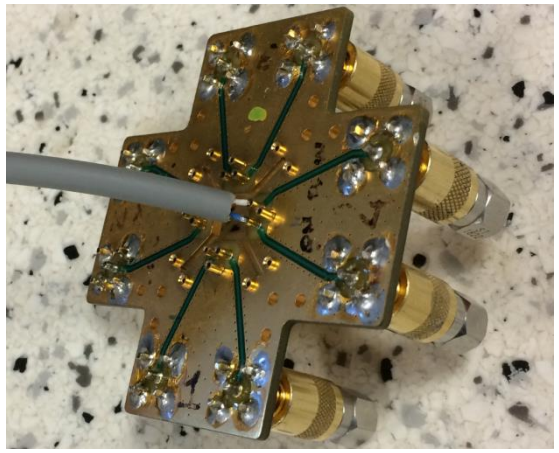


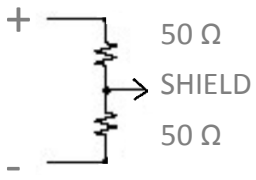


Far End

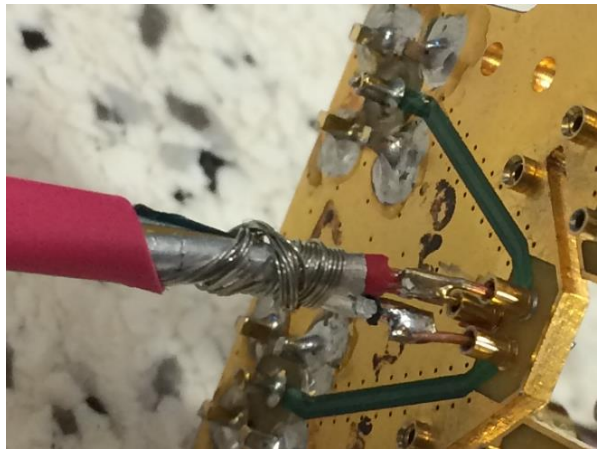
Twin 50 Ω Far End Loads



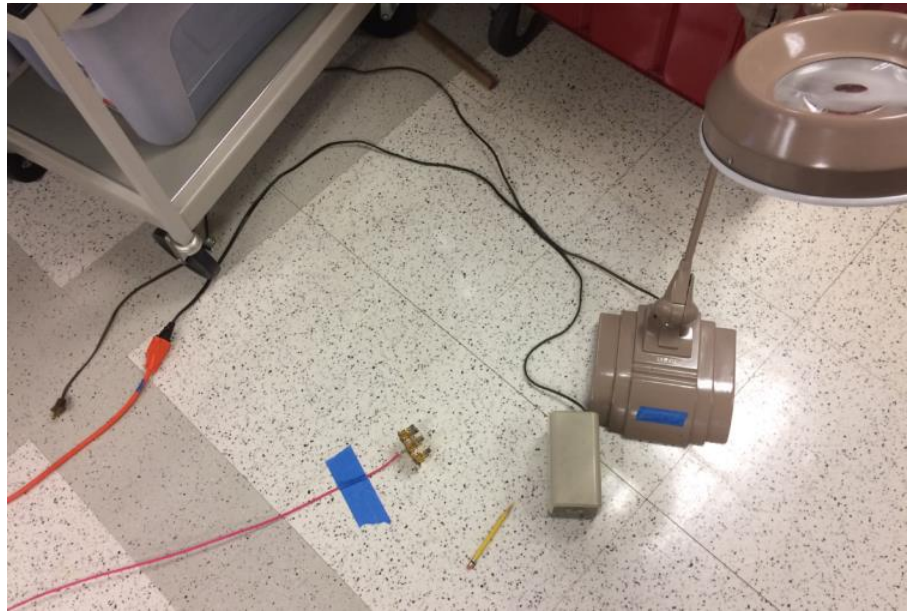




The FTP shield is center tapped



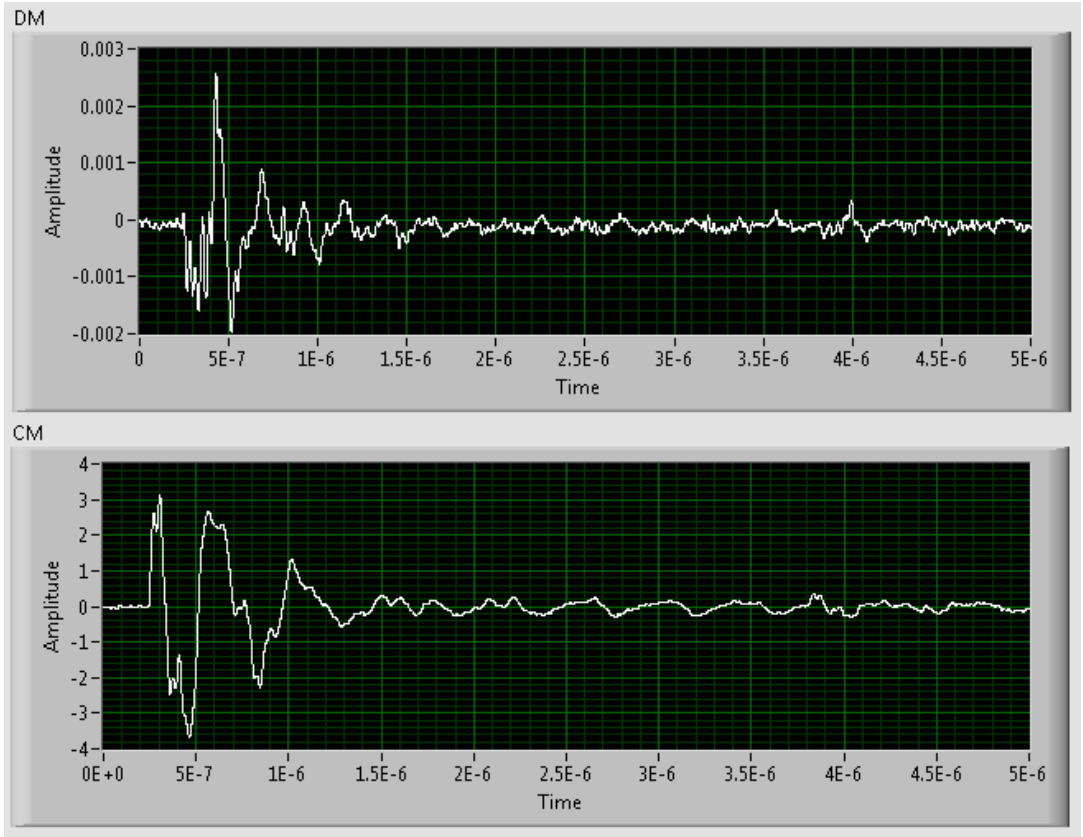
Classic TIA office disturbers (the originals)



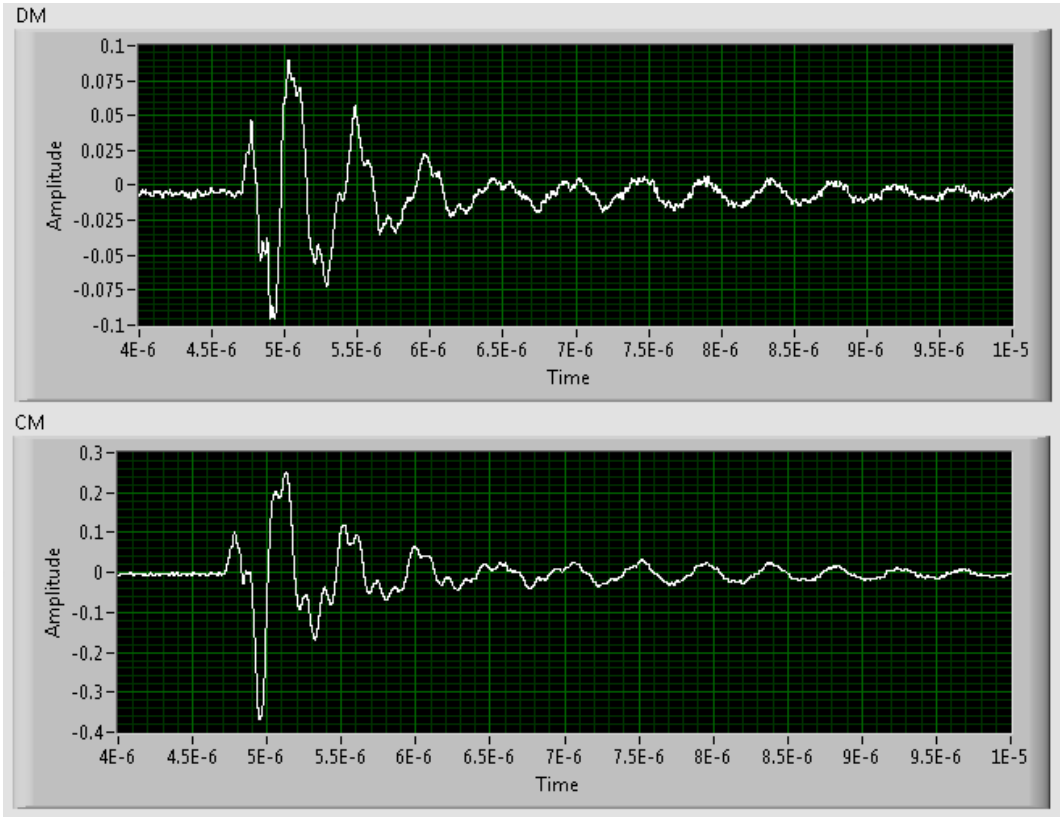
Near End Static Keying Sample

(Squirm in a chair holding the plate, then touch it to the bench ground)

High balance UTP



18 AWG FTP

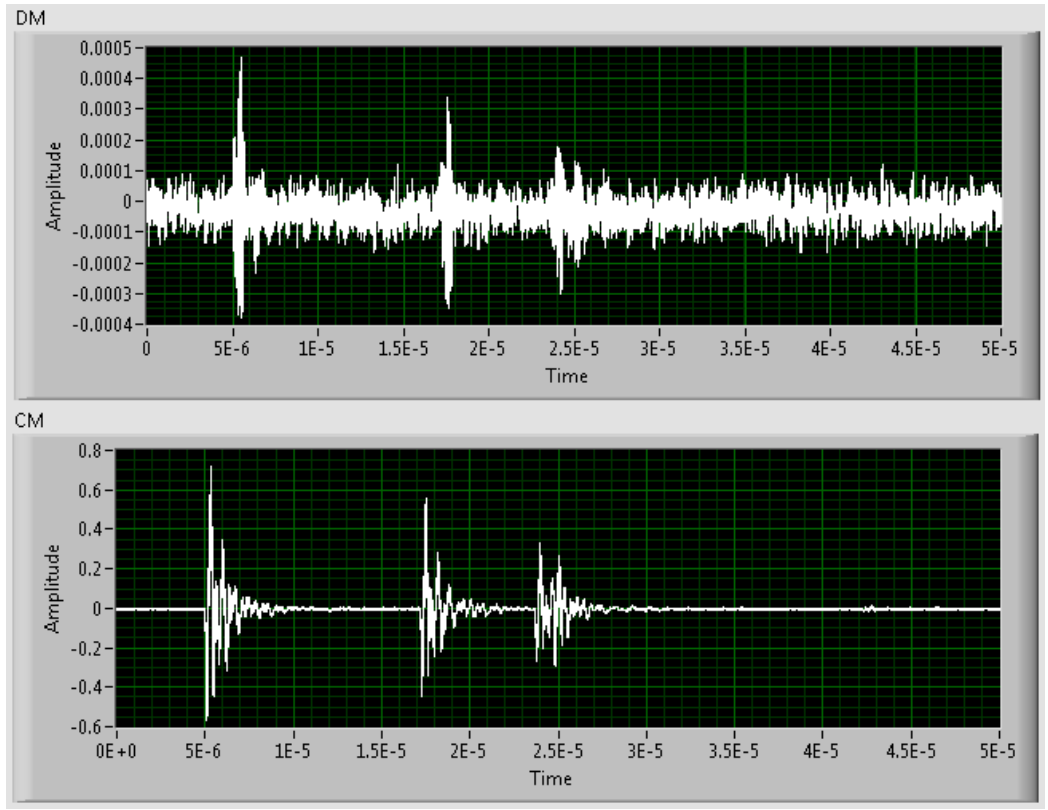


Balance is too low – need to experiment more with other hookups or use better cable

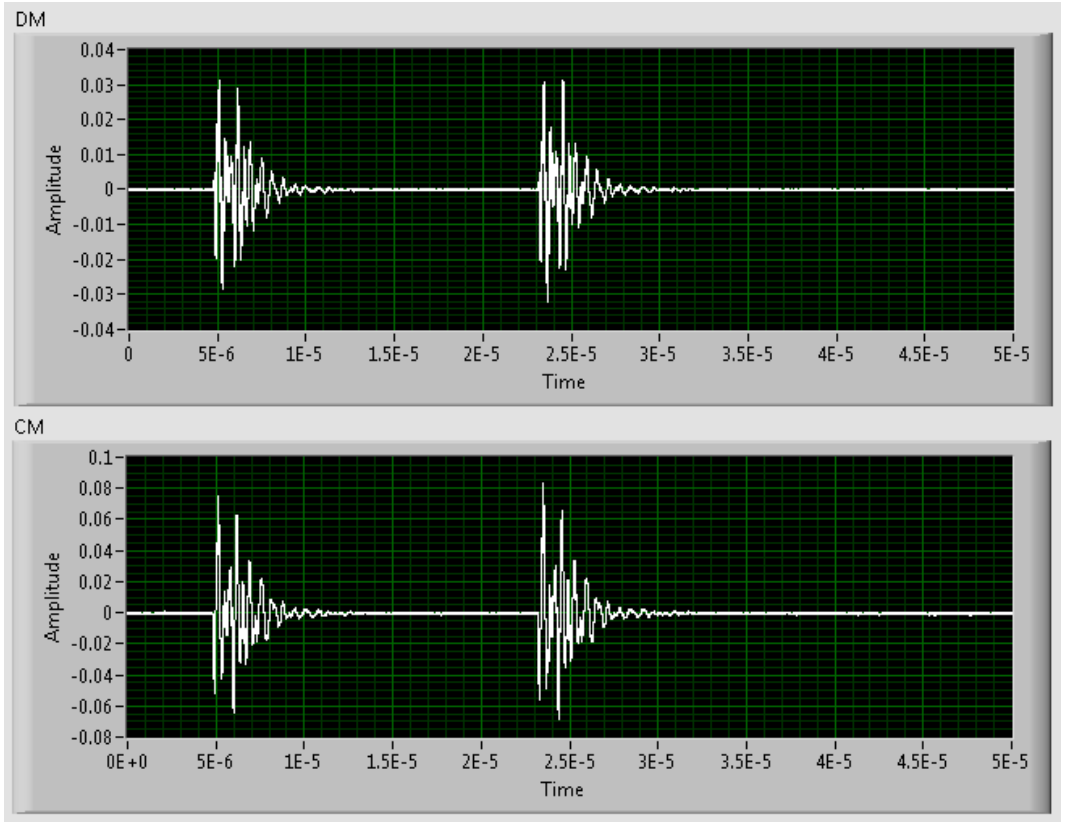
Overhead Lighting Transient Sample

(Flick the overhead light switch)

High balance UTP



18 AWG FTP

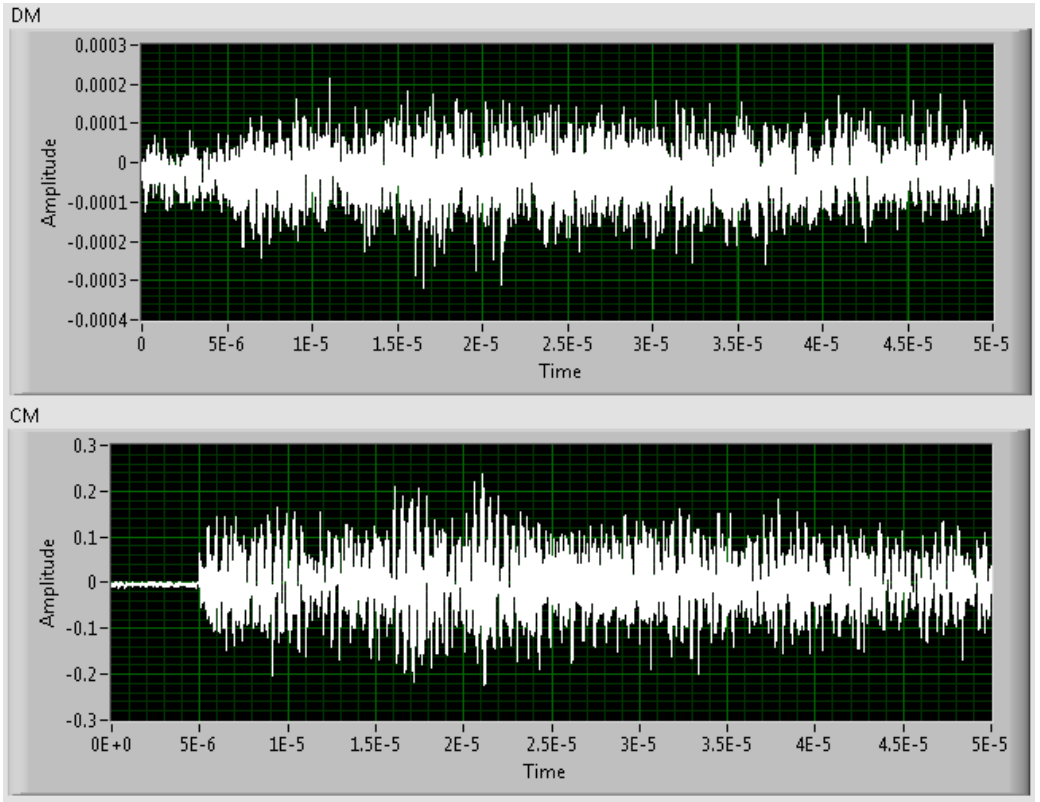


DM scale is too high – can experiment more but the result is still apparent:
High balance makes low DM

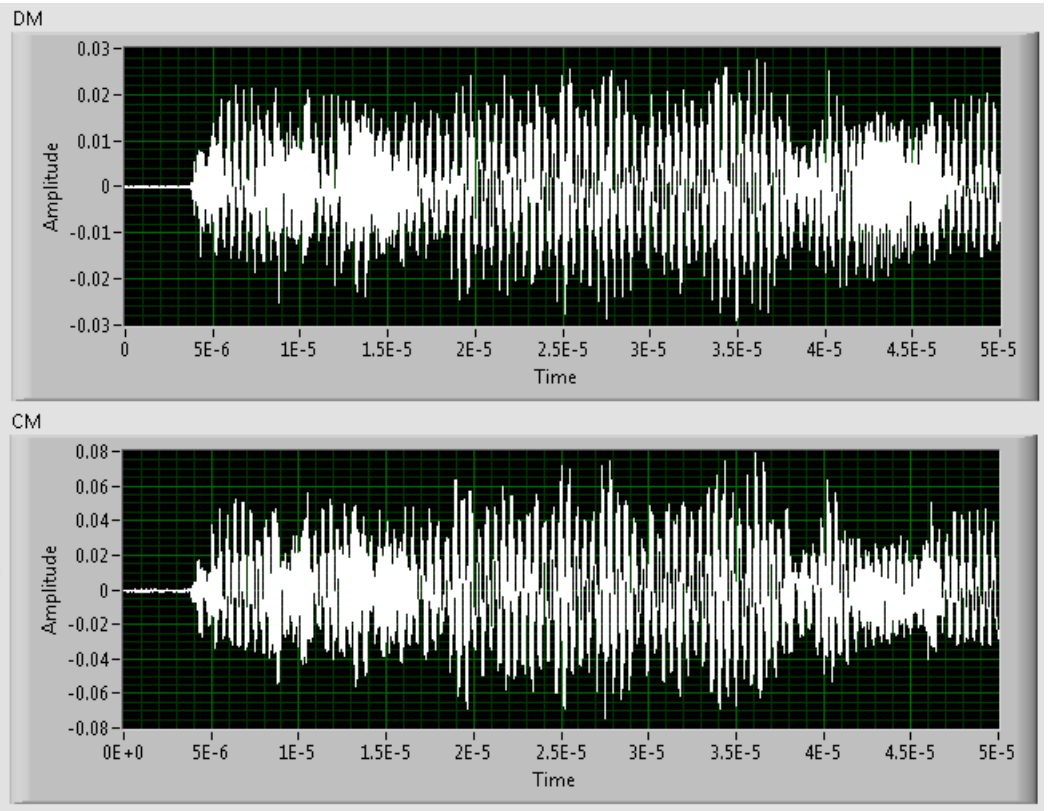
Far End Pencil Sharpener Transient Sample

(Classic Desk Powerline Noise)

High balance UTP



18 AWG FTP

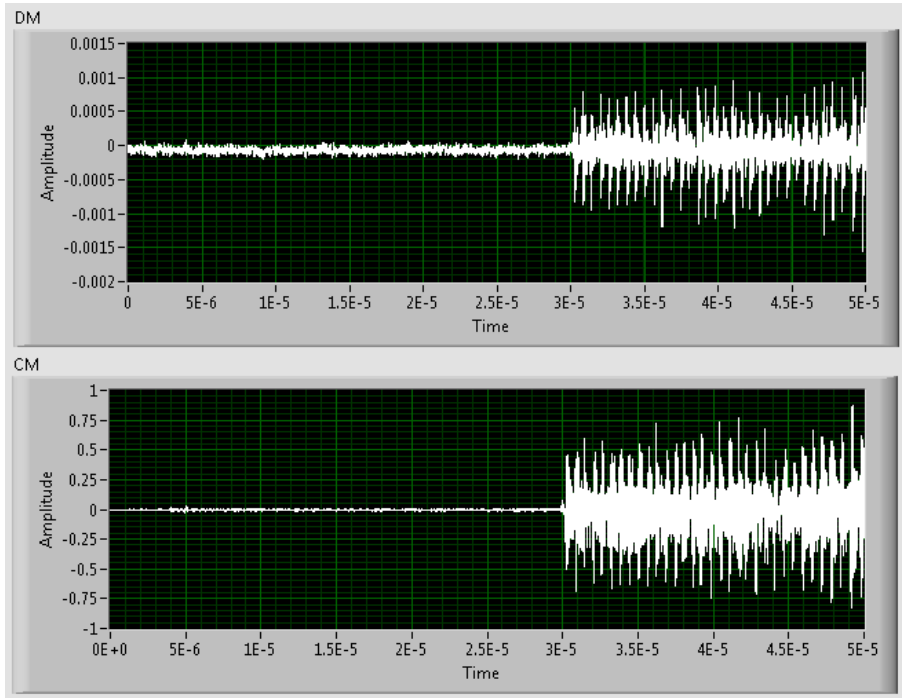


This type of noise can have long time events

Far End Desk Lamp Transient Sample

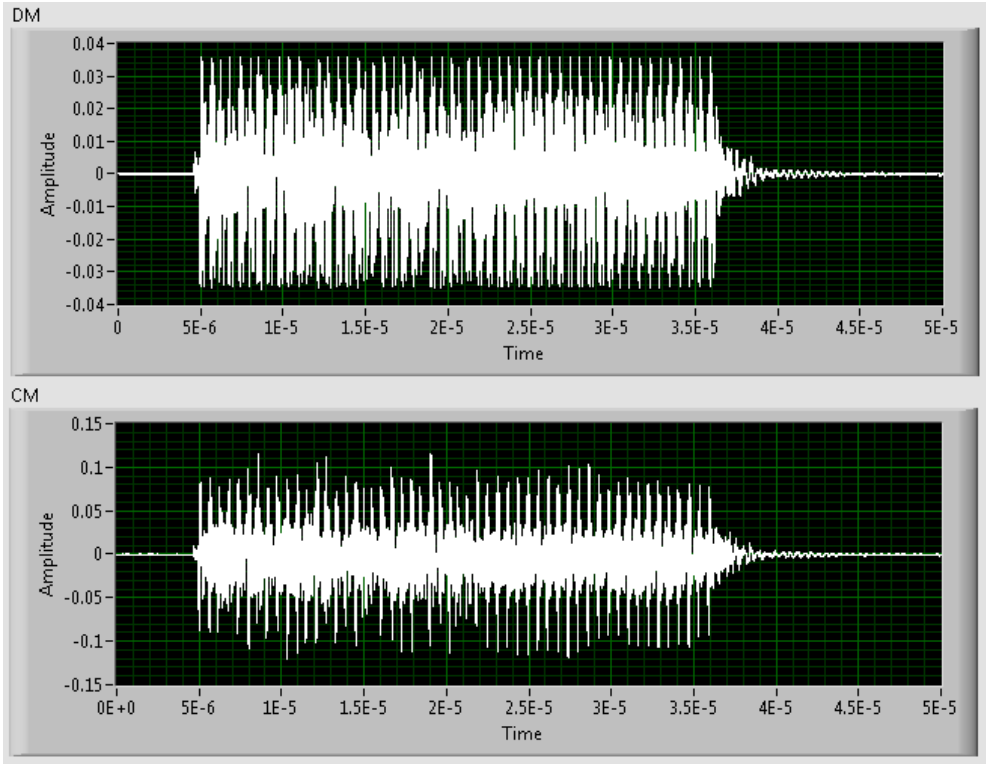
(Classic Desk Powerline Noise)

High balance UTP



(Oops – missed it!)

18 AWG FTP



This type of noise can also be very long

Results

1. Simple setup with simultaneous Differential and Common Mode results

2. Reasonably consistent results across disturbers

3. Need Better FTP Cable
   - How good would it have to be?
   - Do we need to assess minimally performing cables and Spurs/Trees?

4. Need to experiment with FTP terminations and hookup

5. Need to find other cabling types and pathways for study

Issues

- What type of result filtering should be used for these noise measurements?
- What time range and measurement floor should be used and/or is acceptable?
- How should multi-drop be tested?

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Thank You

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