Inductive Loop Design

Design criteria

Compliance with IEC60118-4

→ Flat frequency response	±3dB within 100 – 5000 Hz range (Relative to 1kHz)
→ Average field strength	100 mA/m ±3dB (70-140 mA/m)
→ Maximum field strength	400 mA/m
→ Dynamic range	<12dB

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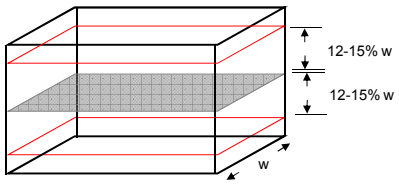
Inductive Loop Design

How it works in practice

- → Create loop around listening area
- → Max 12 meter wide (w)
- → Max area 600 m²
- → Mounted on the floor or ceiling
  - Distance from ear level ±12-15% of width (w) *(calculate that!)*
- → DC resistance between 1 and 3 Ω
  - Cable diameter according to table



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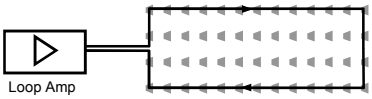
Single loop design



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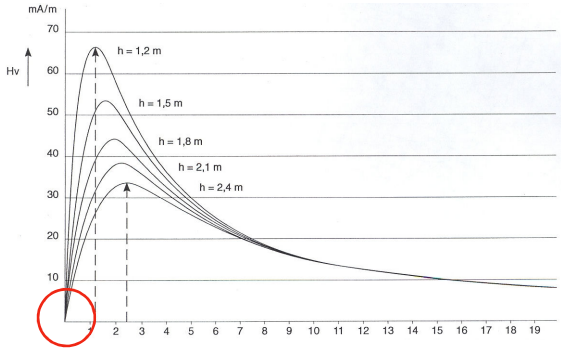
Single loop design

- Field of a single conductor:



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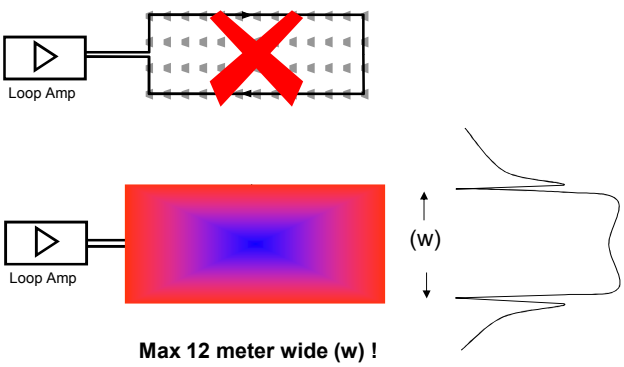
Single loop design



Max 12 meter wide (w) !

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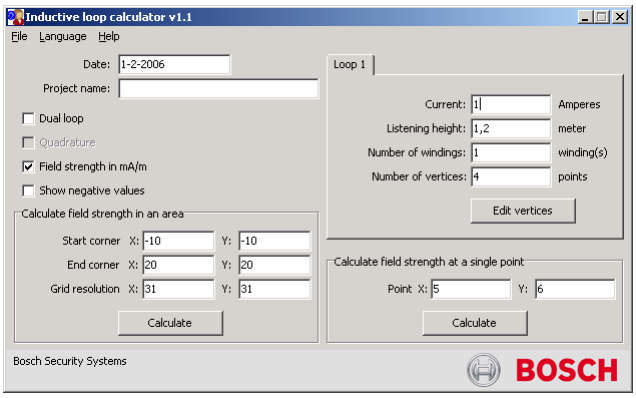
Loop design calculator



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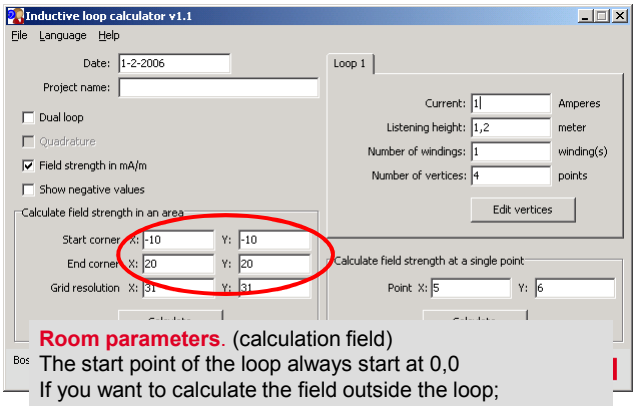
Loop design calculator



Room parameters. (calculation field)
The start point of the loop always start at 0,0
If you want to calculate the field outside the loop;
decrease the start point, increase the end point)

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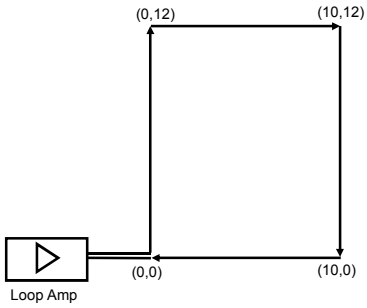
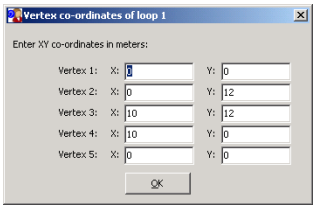
Loop design calculator – default situation





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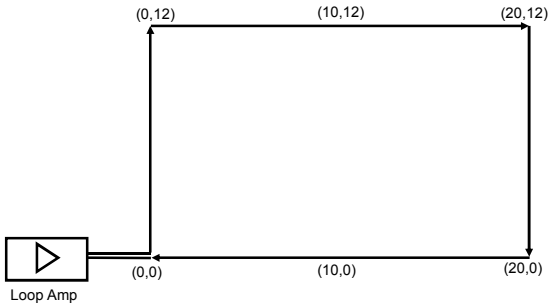
Loop design calculator – the first exercise



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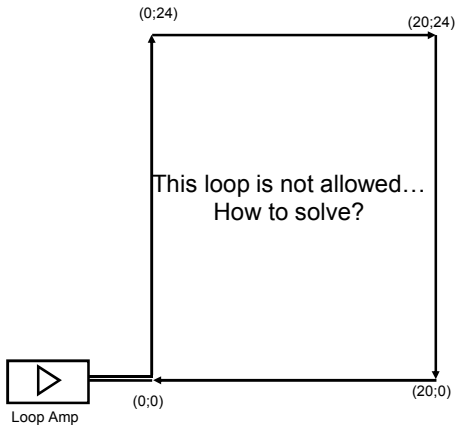
Loop design calculator: wide area



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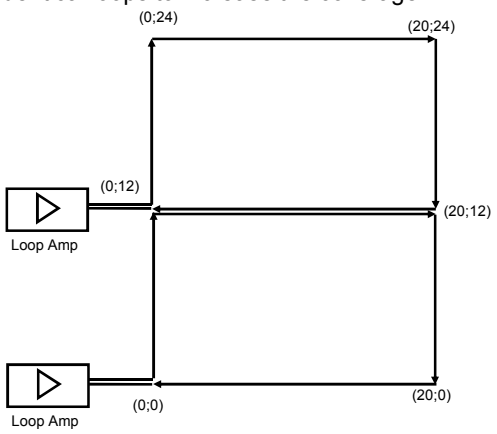
Inductive Loop Design

Loop design calculator: wide area with dual loop

- 2 identical loops to increase the coverage …



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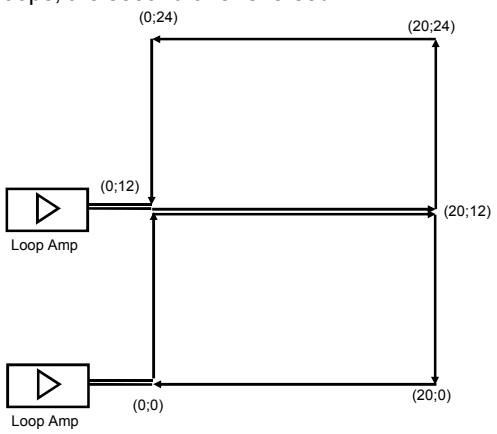
Inductive Loop Design

Loop design calculator: wide area with dual loop

- 2 loops, the second one reversed!



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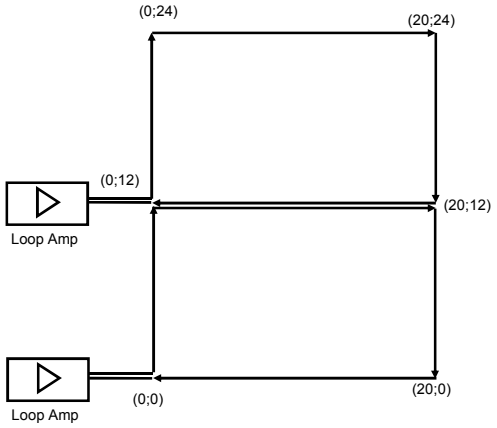
Inductive Loop Design

Loop design calculator: wide area with dual loop

- overlap to improve the coverage …



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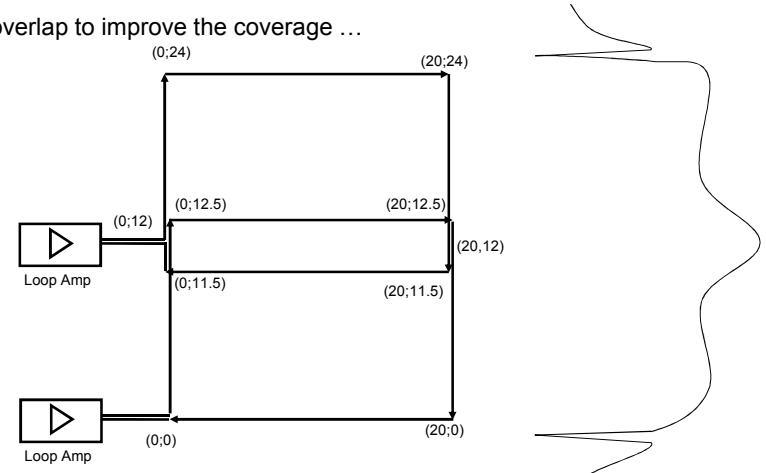
Inductive Loop Design

Loop design calculator: wide area with dual loop

- overlap to improve the coverage …



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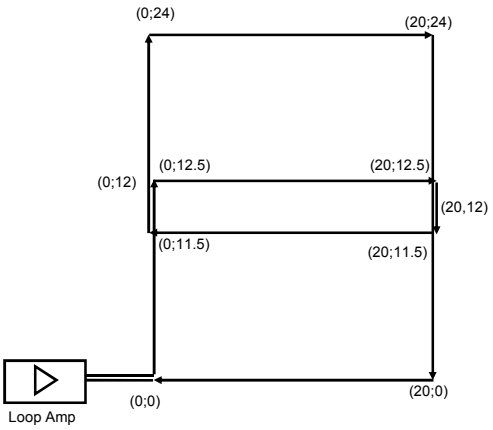
Loop design calculator: meandering the (dual) loop



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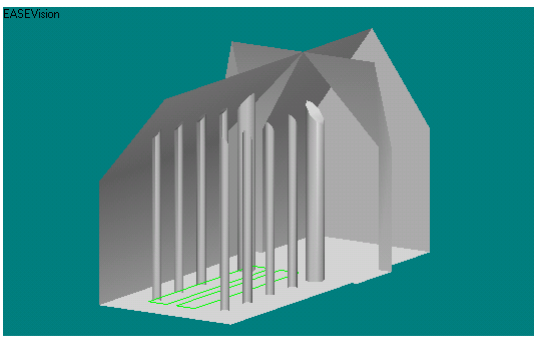
Loop design calculator: an example

- 2 audience areas
  - 11 x 5 m.
- Aisle inbetween
  - 2 meter wide
- Best solution?



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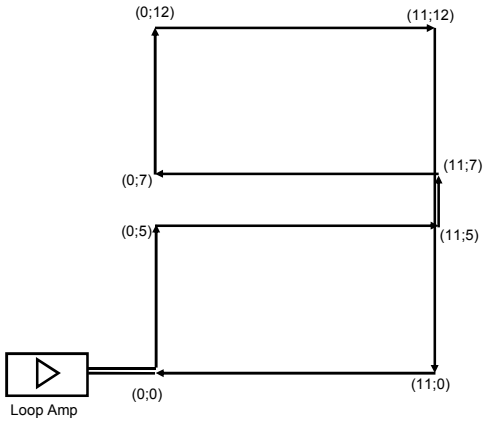
Loop design example: alternative I



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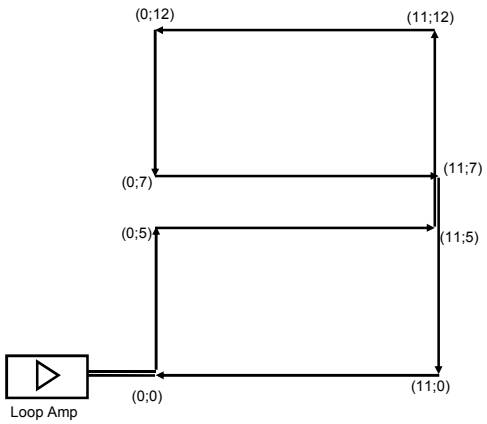
Loop design example: alternative II



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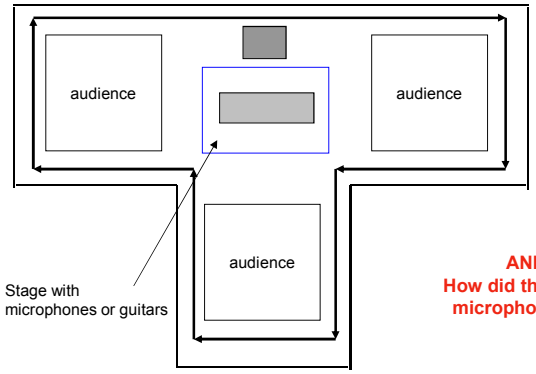
Inductive Loop Design

Loop design: influence on dynamic microphones

- Straightforward solution



AND…
How did the dynamic microphone work?

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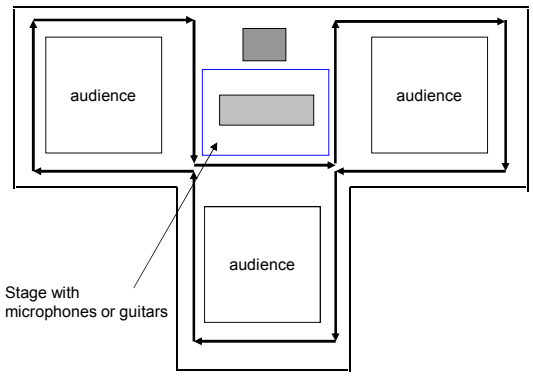
Loop design: influence on dynamic microphones

- The alternative solution



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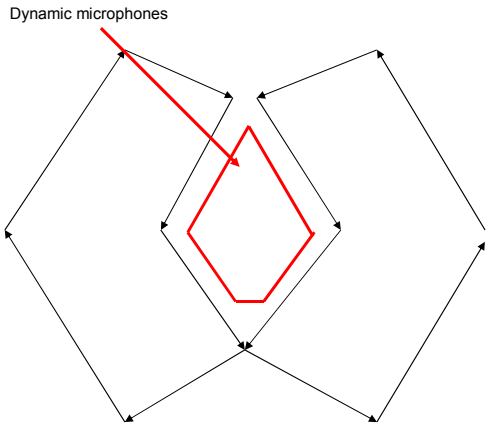
Loop design: no field required everywhere



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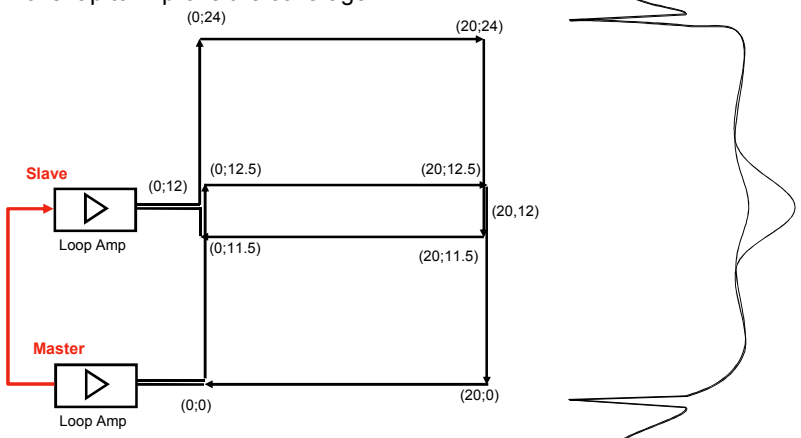
Inductive Loop Design

Loop design calculator: wide area with dual loop

- overlap to improve the coverage …



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Inductive Loop Design

Loop design: quadrature loops

- Create multiple loops without interference (increase or reduction)
- To cover larger areas
- To get a higher field strength
  - Compensate for metal loss
- To create low spillover schemes (= the effect of smaller loops!)

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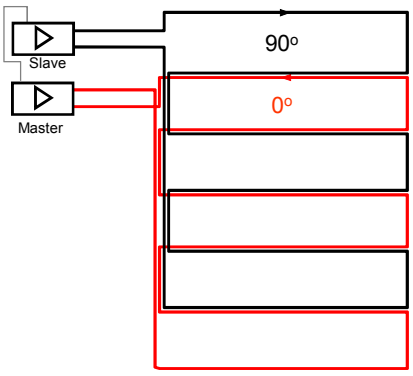
Inductive Loop Design

Quadrature System

Multi loops



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Quadrature loops – low spillover

- What?
  - Multiple loops
  - Small loops
  - Some overlap (0.5 – 1 m)
  - Outer loops smaller than the others
- How?
  - Adjacent loop helps reduce spillover
  - Dimension of loop is small, so dimension of spillover is small
  - Lower current means lower spillover
  - Mind the orientation

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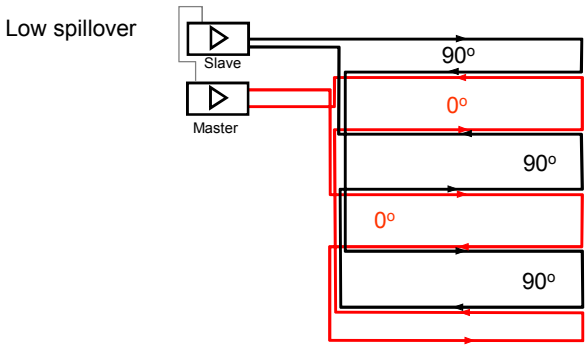
Quadrature System



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Thank you for your attention

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