TRANS versus GLOBAL nfb

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11:00

for demonstrations visit us at System Room ………

Menno van der Veen

www.mennovanderveen.nl

info@mennovanderveen.nl

My goal of this lecture:

I notice a fundamental difference

between Trans and Global feedback.

In this lecture I describe it

and give new design rules.

Content of the Lecture:
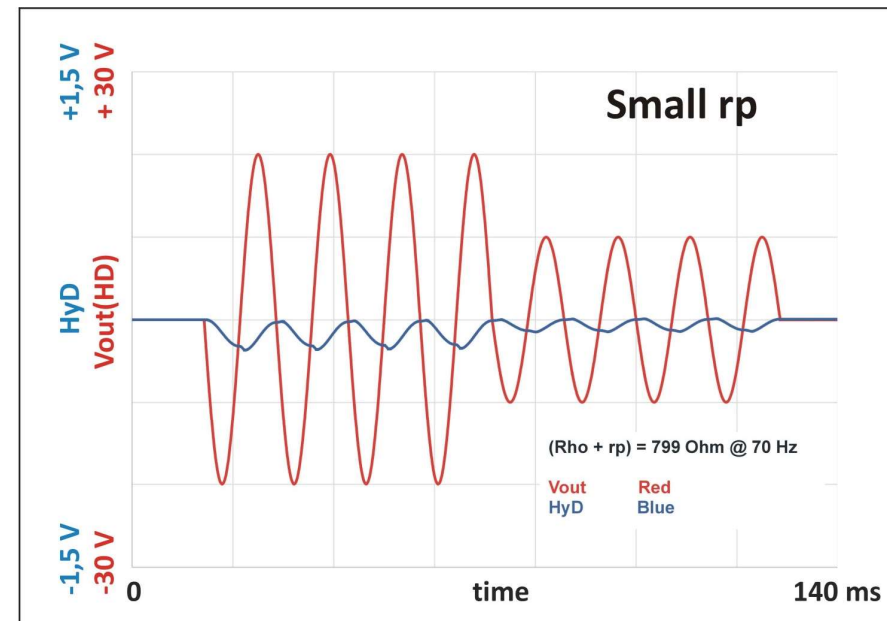
Why feedback

Trans solution
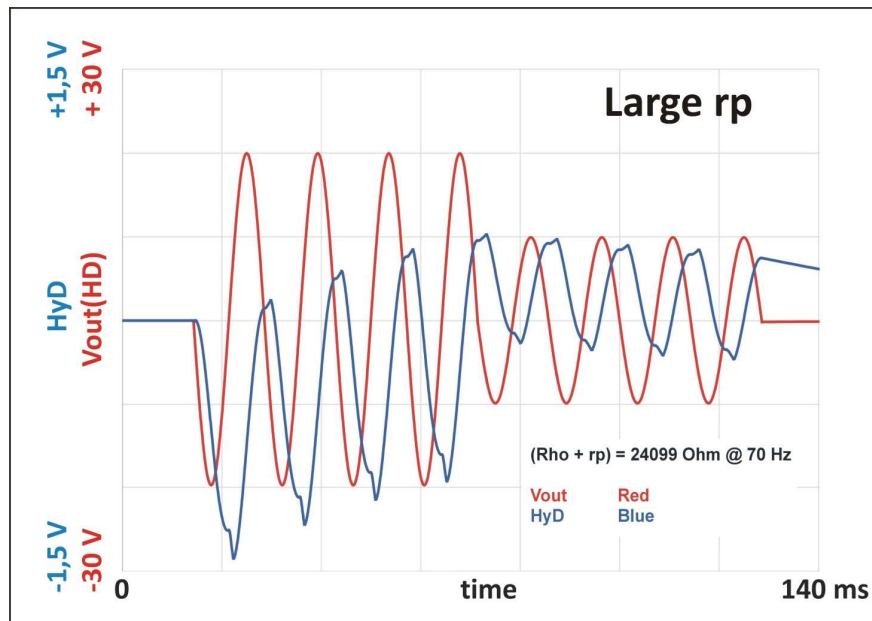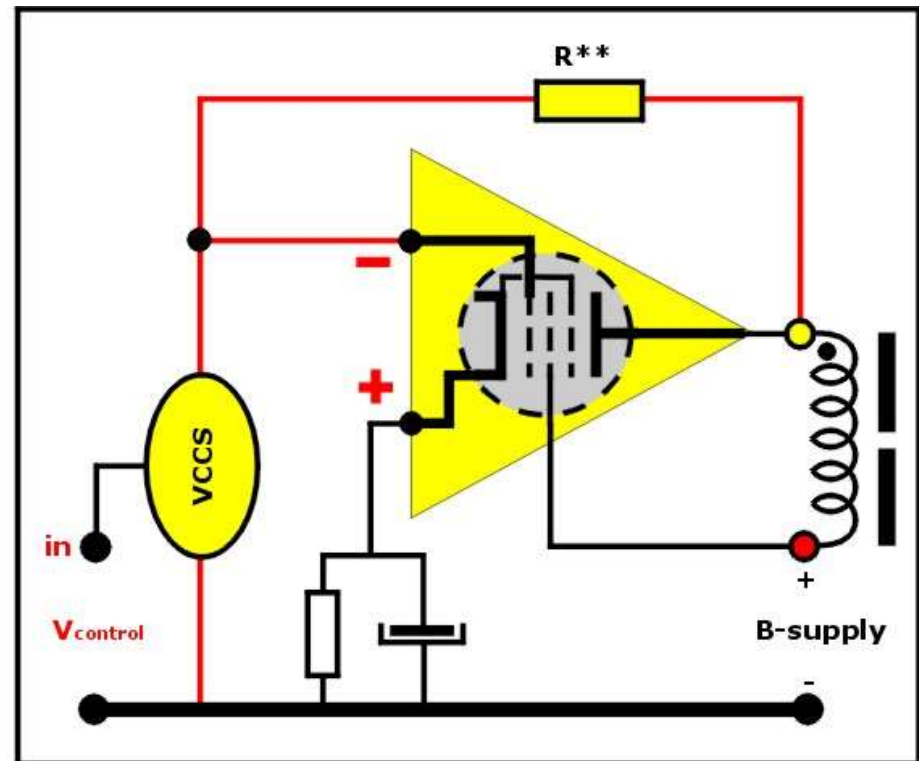
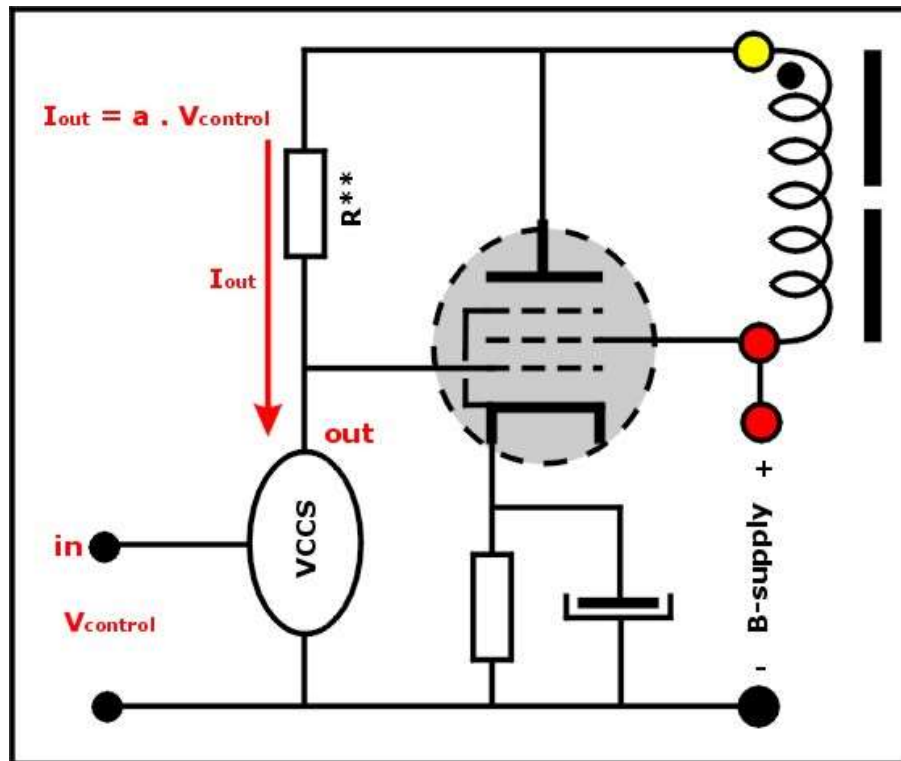Global solution

Measurements

Subjective results

New rules

Why do we need Trans or Global nfb ?

- To make tube distortions small   (harmonic distortions)
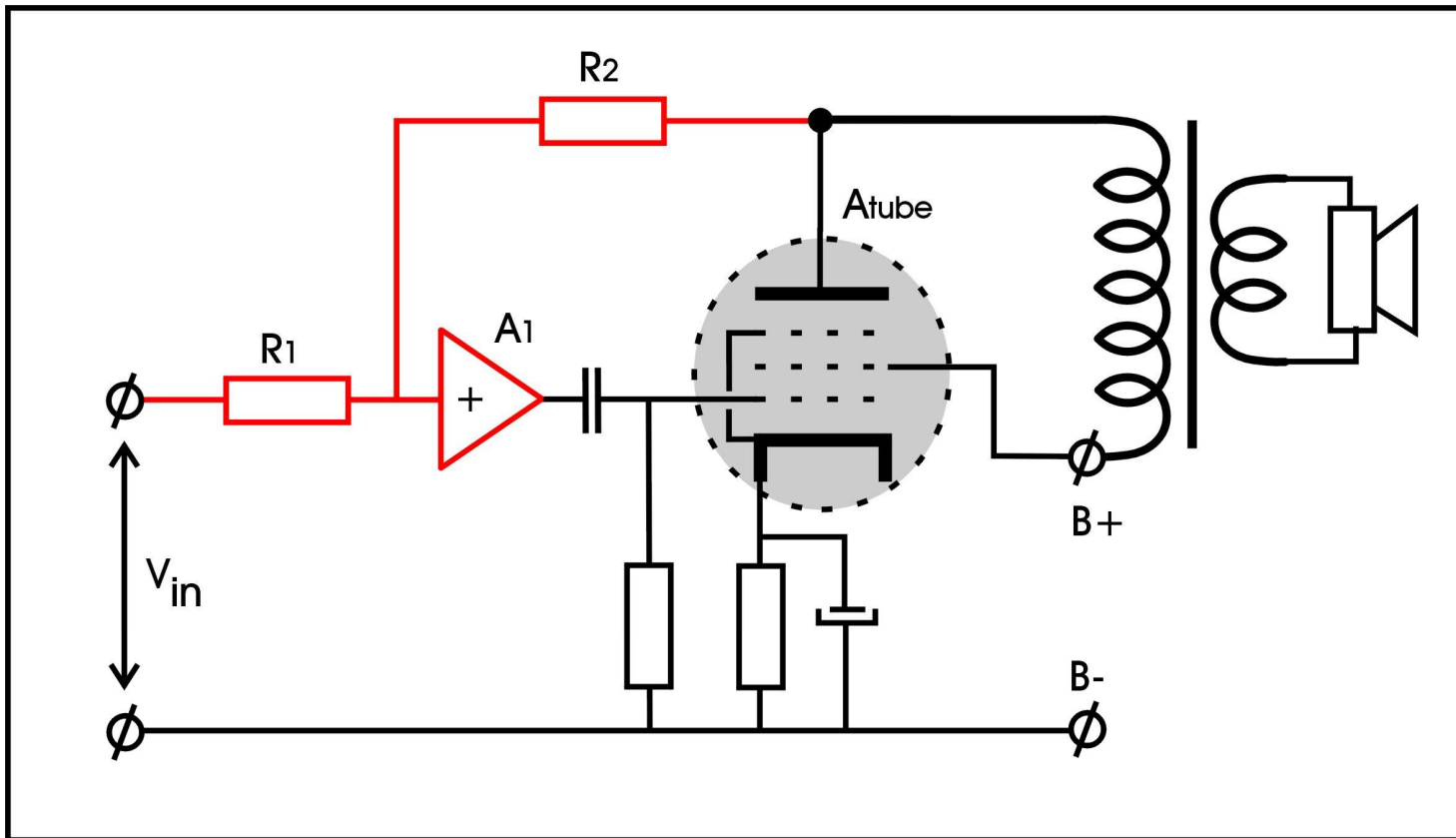- To make the plate resistance small   (magnetic distortions)

What is Trans ?

feedback = power-tube-gain = μ_{g1g2} (approx. 35 dB)

What is Global nfb ?

feedback = $1 + \beta \cdot (A_1 \cdot A_{tube} + 1)$ with $\beta = R_1 / R_2$ (approx. 42 dB)

Why feedback taken from Primary

- Feedback is very large (much more than 30 dB)

- With nfb from secondary = stability problems

- With nfb from primary = less influence of Lsp and Cip

- With nfb from primary = small Rip = less Hysteresis distortions

Trans and Global compared

TRANS : fets are current source
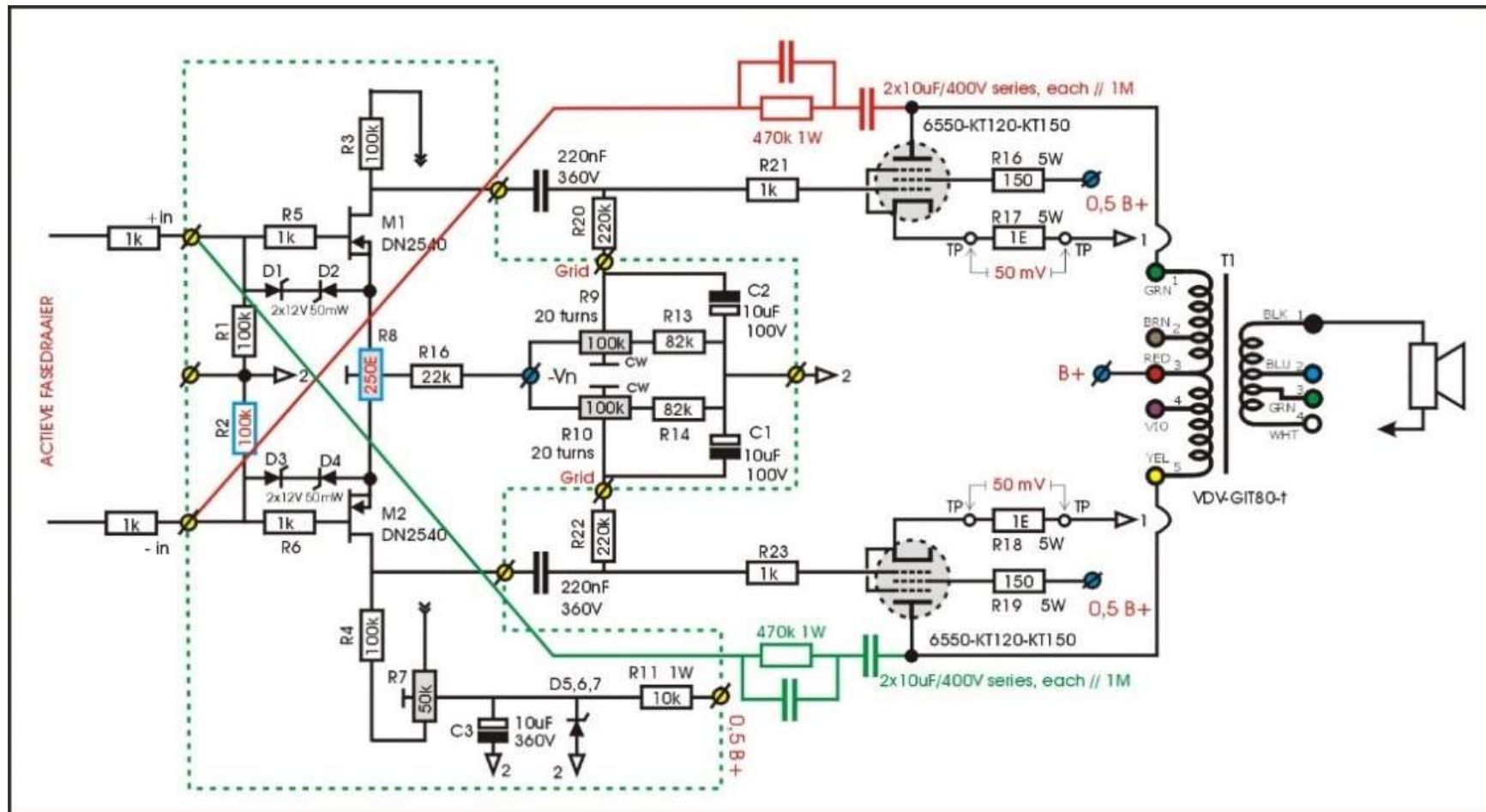
GLOBAL NFB : fets are amplifier A1
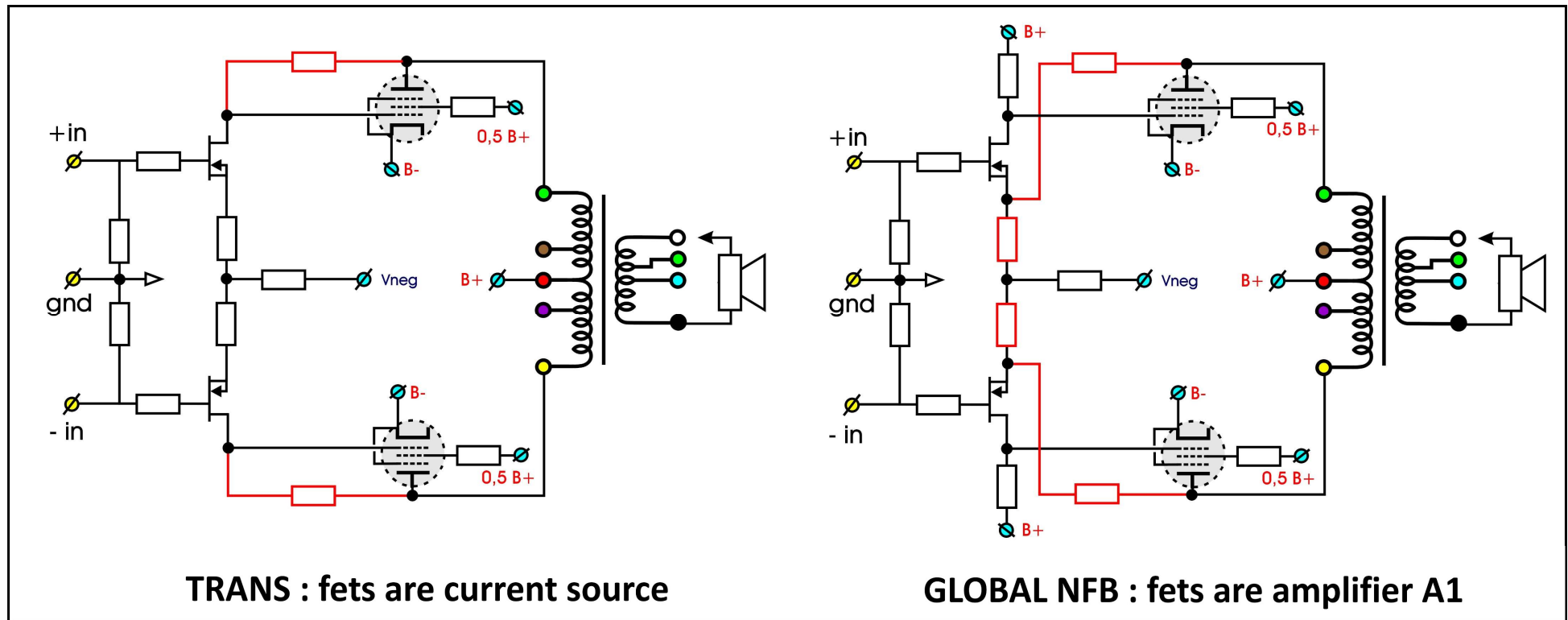
Don't build this; circuits are conceptual.

Practical version of Trans

- We demonstrate our newest version at ETF

- Research is almost finished

- When ready, publication will follow

Practical version of Global

measurements Trans and Global

	Trans	**Global**	
P_{max}	45	100	[Watt]
f_{-3L} to f_{-3H}	2 Hz - 60 kHz	4 Hz - 72 kHz	[Hz - kHz]
THD @ 1 Watt	0,03	0,003	[% @ 1 kHz]
Z_{out} @ 1 kHz	0,35 0,16 from OPT	0,36 0,16 from OPT	[Ohm @ 4Ω-tap]
Feedback	35	42	[dB]

Subjective Differences

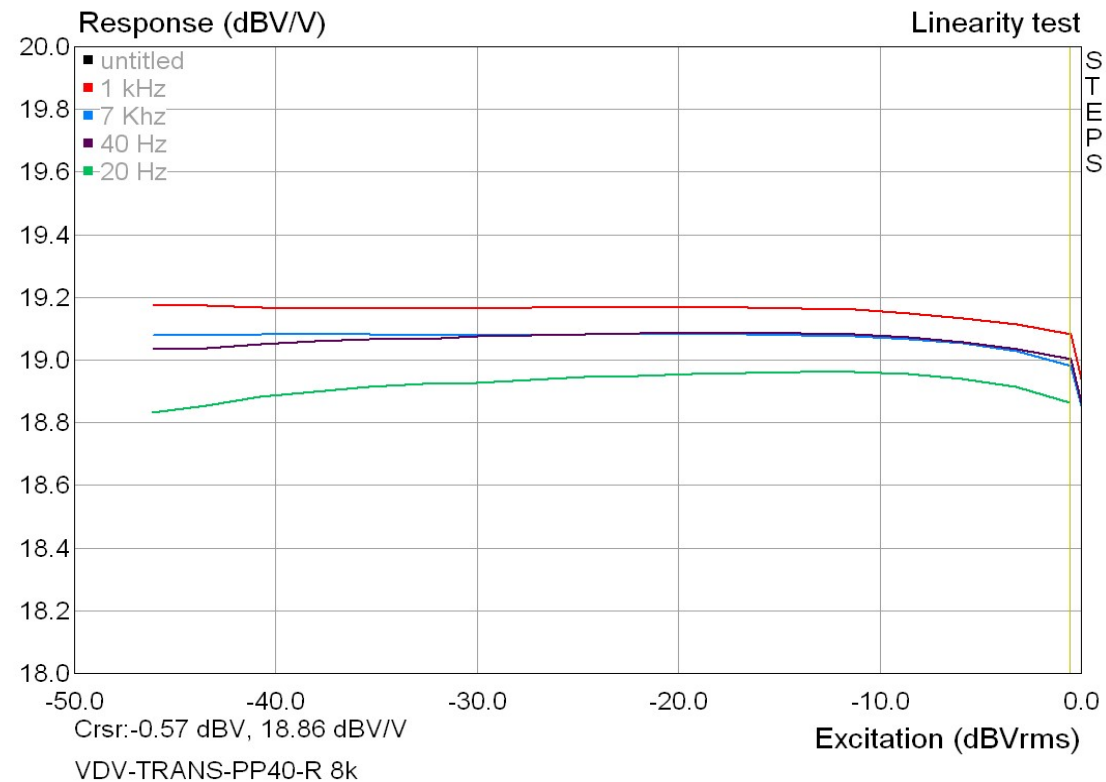|	Trans	Global
Power :	ok	ok
Dynamics :	ok	ok
Speaker damping :	ok	ok
Frequency range :	ok	ok
Distortion :	ok	ok
Spatial information :	clear and continues	weakened
Sound field :	around speakers	between and behind
It sounds like :	the sound is here	the sound is there

Searching in the frequency domain (H3)
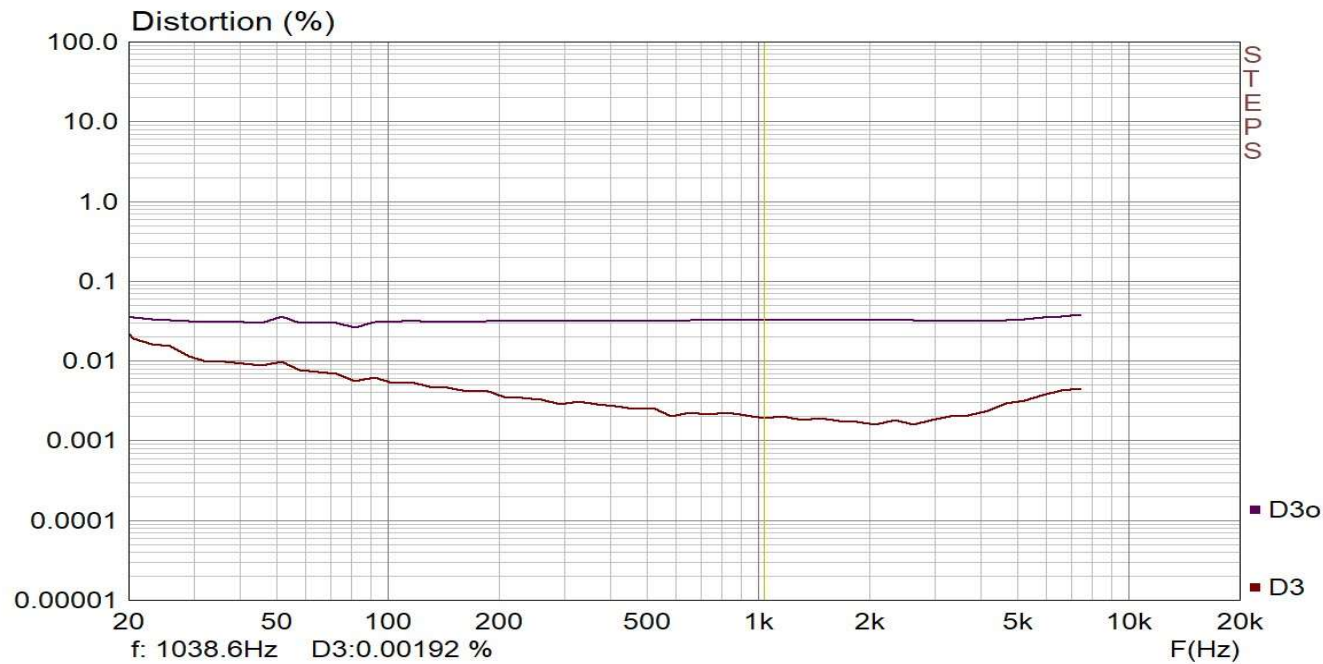
This is a 'fresh-dull' issue which I did not notice

Searching in the amplitude domain

Trans and Global behave equal. Compression is not noticed

Let's look more precise to observations

- Arvo Pärt: "Miserere"; track-3 : ECM-1480
- Timpani-strokes creating a long reverb field
- At the moment of a new stroke sounding:

- Global **suppresses** previous reverb when louder sound arrives
- Trans **doesn't suppress** previous reverb when louder sound arrives

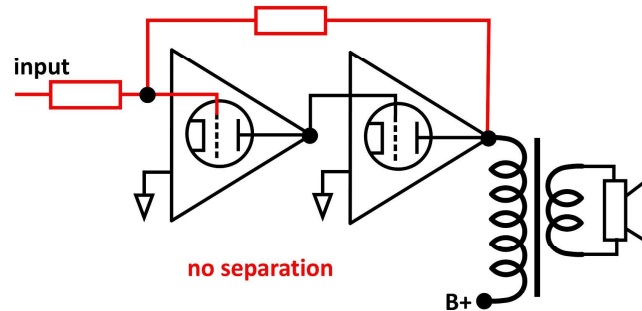- Global affects the **natural character** of the reproduction

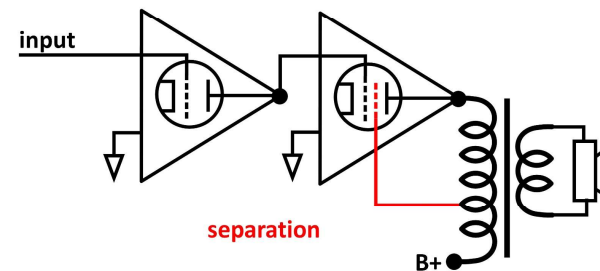# Let's add other experimental results
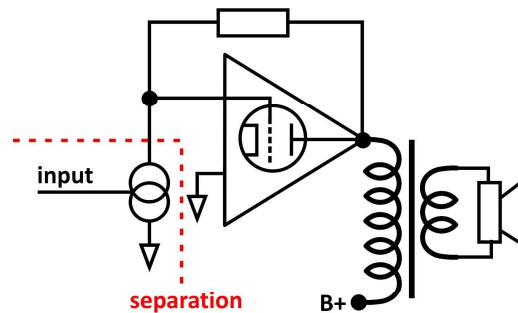
TRANS subj = 9
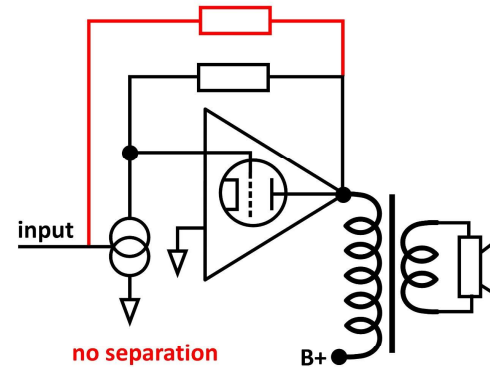
TRANS + **GLOBAL** subj = 6

GLOBAL subj = 8

ULTRA LINEAR subj = 7

Two conclusions:

- nfb over **one** Transfer-function: subjective best
- nfb over **more** Transfer-functions: subjective worse

- **separation** between input and speaker: subjective best
- **no separation** between input and speaker: subjective worse

- Can I explain this?   Partly, but I already know how to use it.

What Trans-Global has taught me

Fundamental:

1   Trans: only one tube-transfer-function interacts with the speaker

2   Global: which transfer-function are you listen to?

Practical:

1   Trans and Global feedback from OPT's primary is most stable

2   Speaker interaction only with last Trans-tube

3   Don't combine Trans and Global on the same amp-stage

4   Sequence of local-nfb-amp-stages, with Trans as last, sounds 'Trans'

Thank you. Questions-Remarks-Comments