

Program Loudness Control

Steve Lyman

steve.lyman@dolby.com



Measurement of Audio

- Best advise I ever had...
- Use a Peak meter to protect the equipment and
USE YOUR EARS to make the Program.

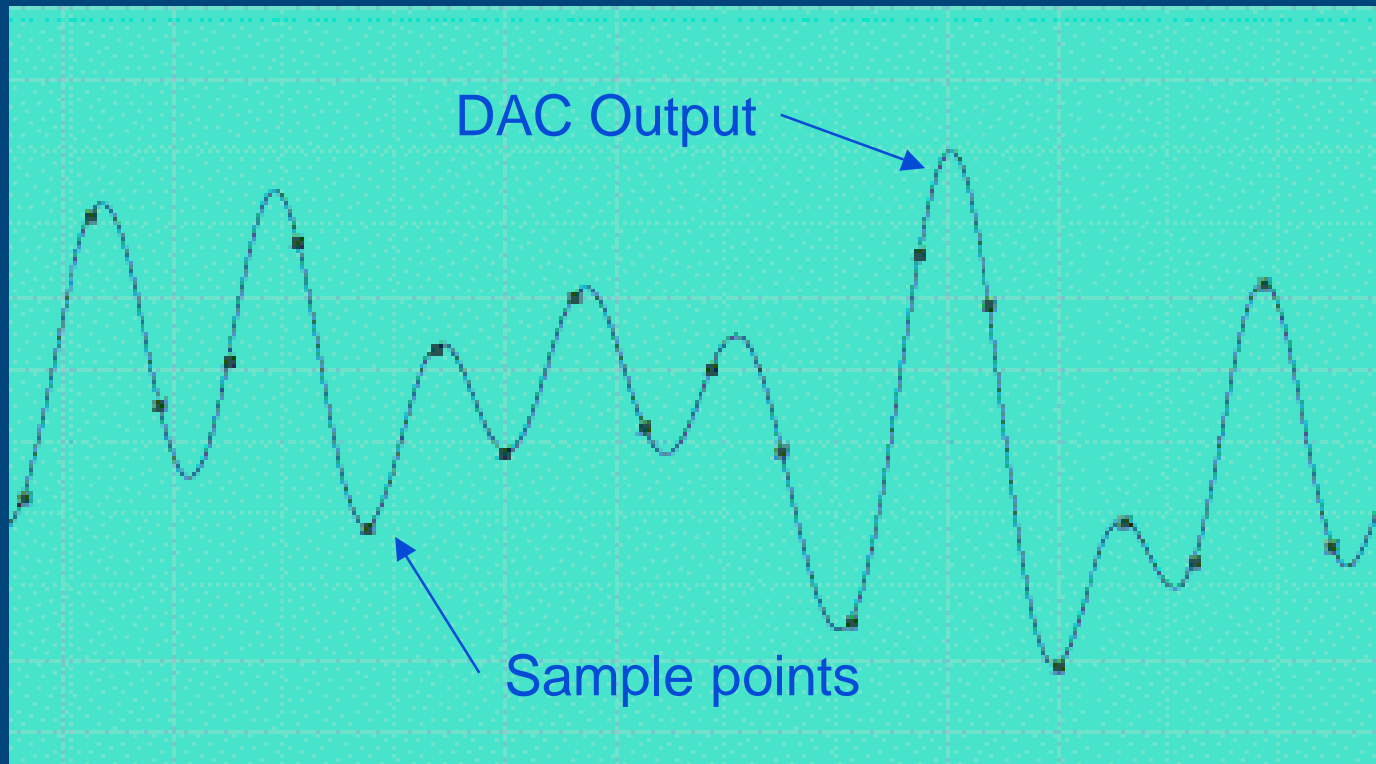
Standard Peak Meters

- PPM characteristics (Mechanical meters)
- Rise to 80% of the steady state reading within 5 or 10 ms (depends on that variant of the IEC 60268 Standard selected)
- Fall back by 20 or 24 dB in 1.5 to 2.8 seconds

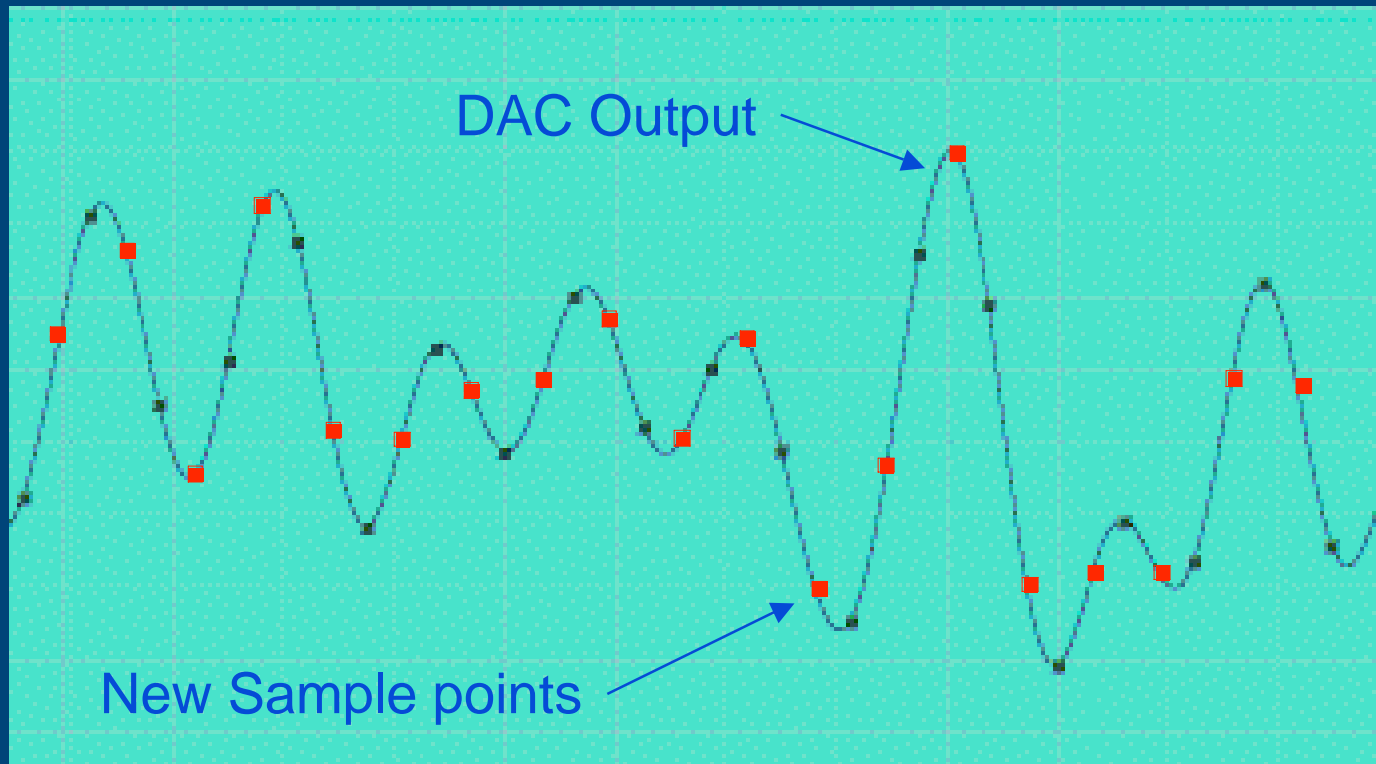
- PPMs usually under estimate the amplitude of fast peaks by about 3 dB.

- Electronic PPM Characteristics
- Anything goes...

Peak measurement in the Digital domain



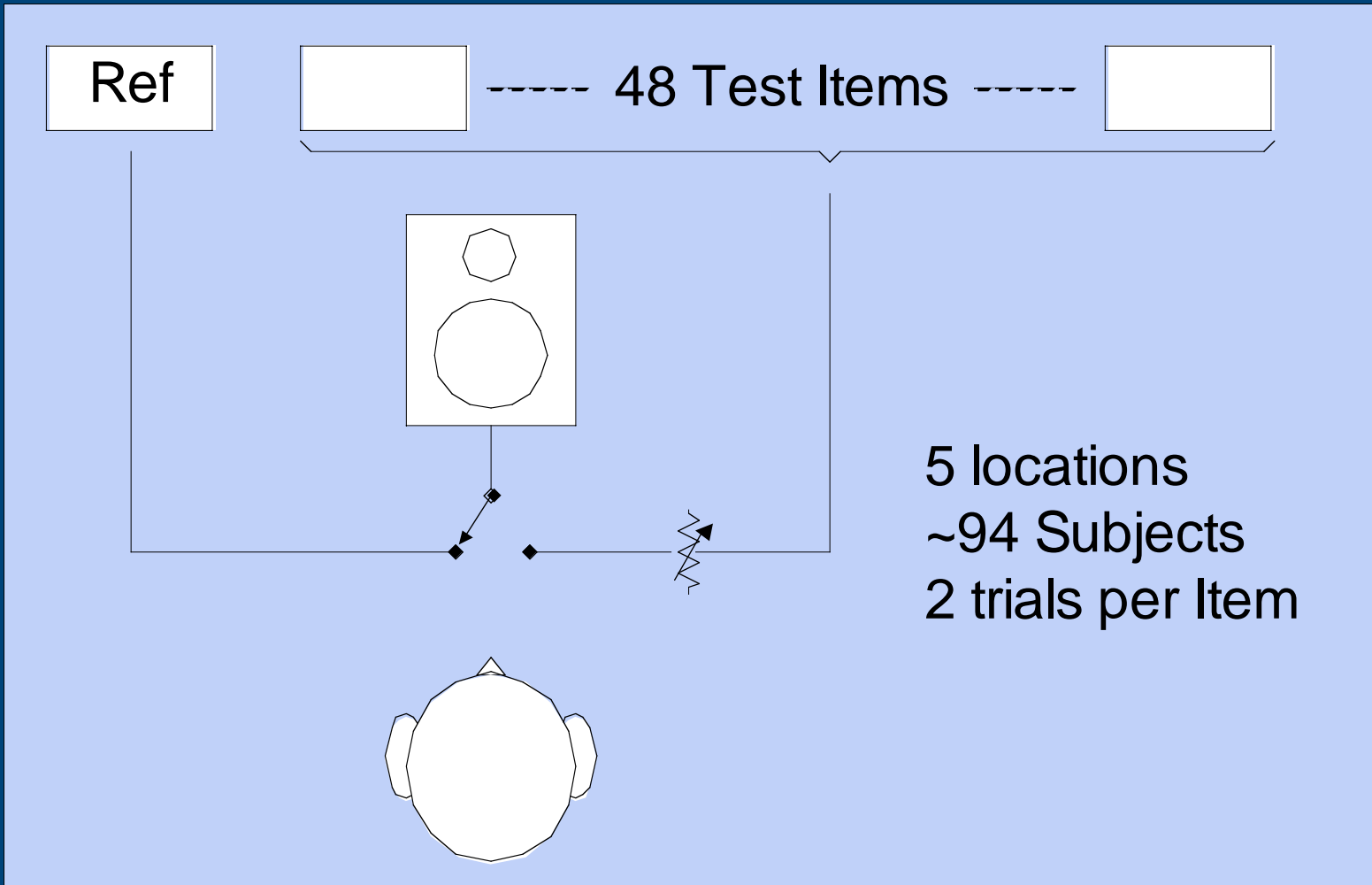
Oversample to fill in the gaps and measure something closer to the true analog signal peaks



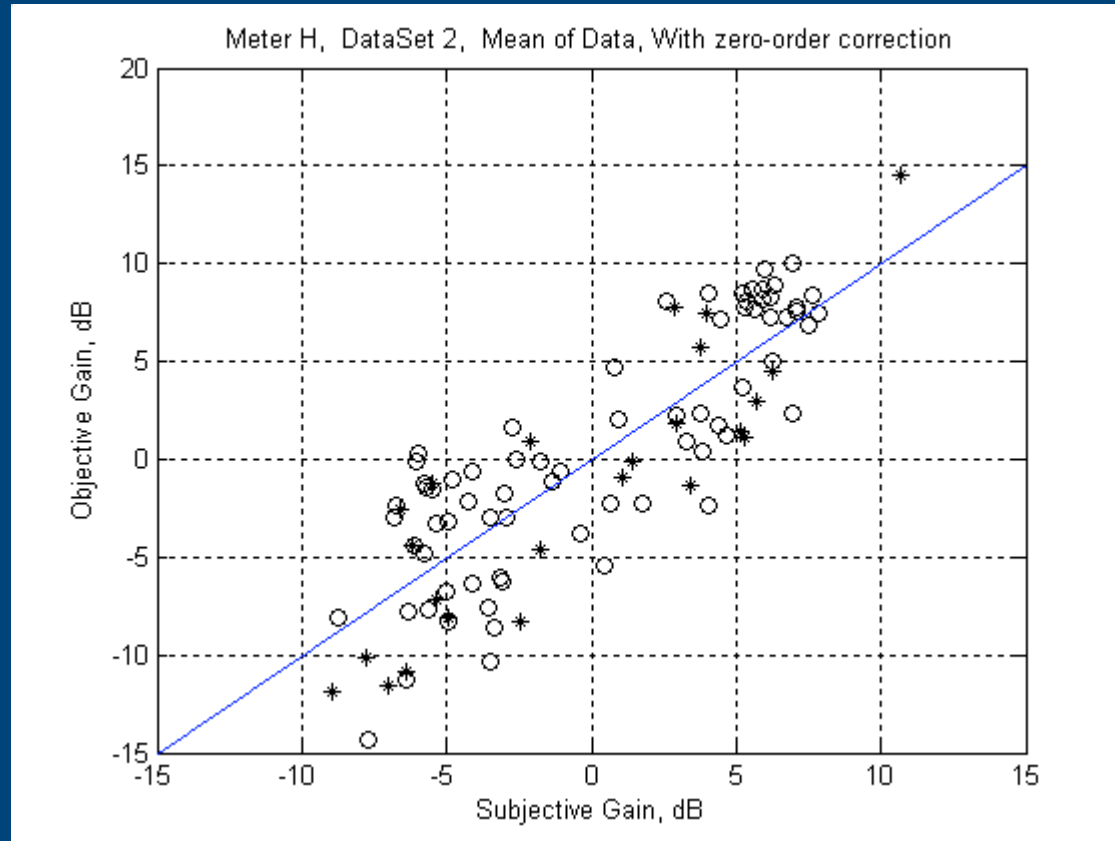
Loudness Measurements

- VU meters indicate neither Loudness nor Peak levels
- Zwicker (ISO 532 b) and Stevens (ISO 532 a) take 1/3 octave or 1 octave band level measurements and add up the contributions from each band. Best suited to steady noise measurements.
- Dolby 737 is used to limit the levels in Cinema. It is biased toward the Annoyance level of a soundtrack, not the Subjective Loudness.
- LeqA intended for industrial noise use.
- Current DTV audio spec uses LeqA – works well on voice
- ITU undertook the standardization of a Loudness meter that would correlate well with the Subjective impression of loudness of all program material .

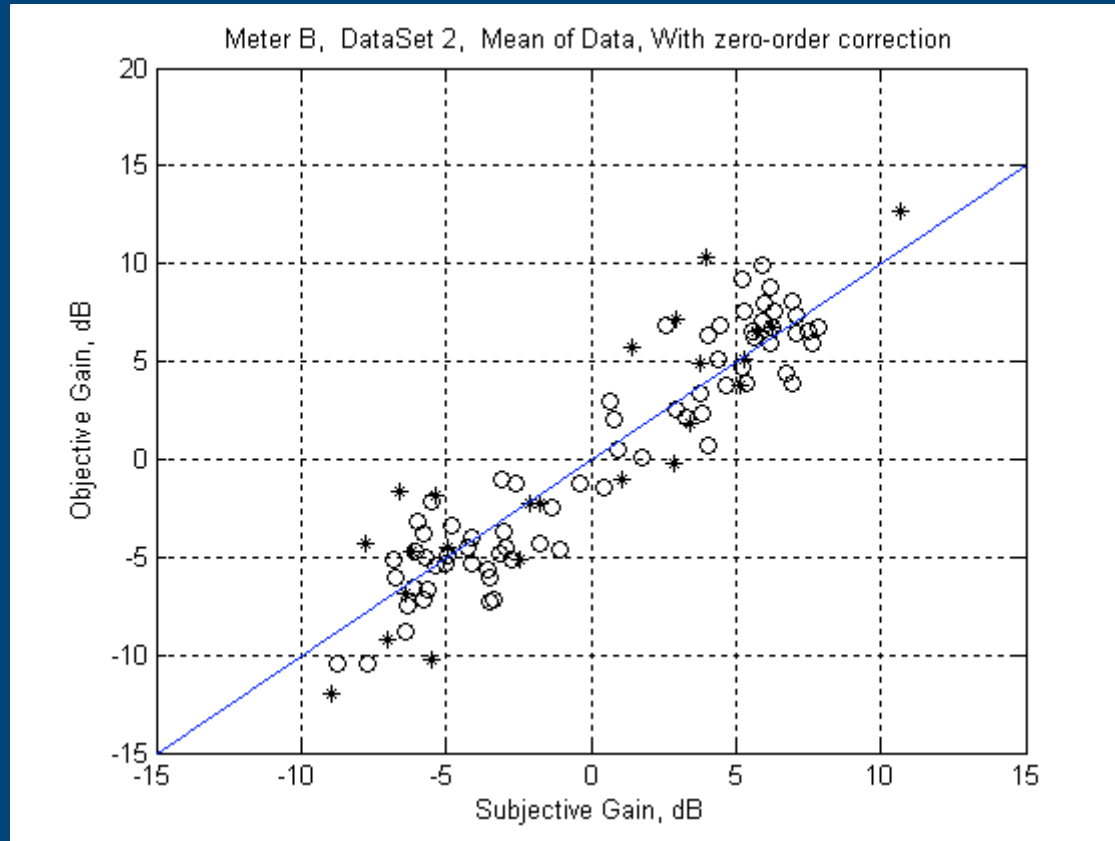
ITU Subjective Assessments



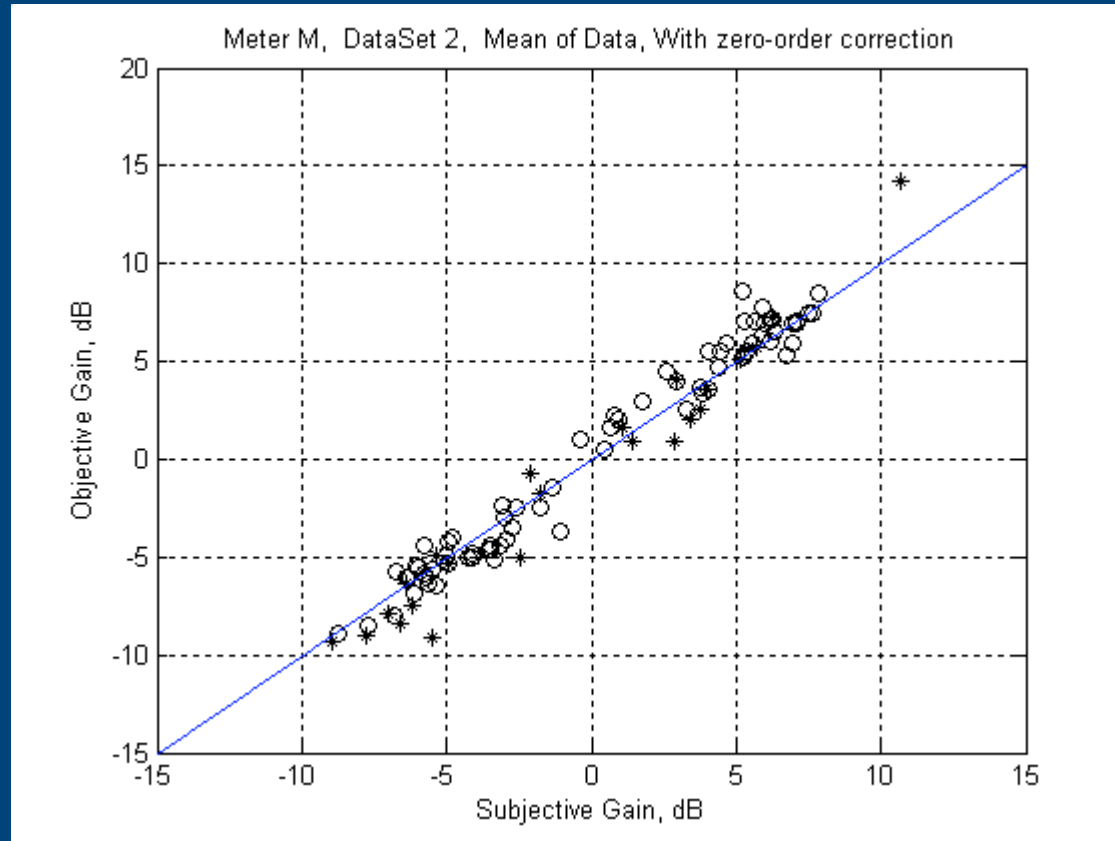
A Poor Loudness Estimator



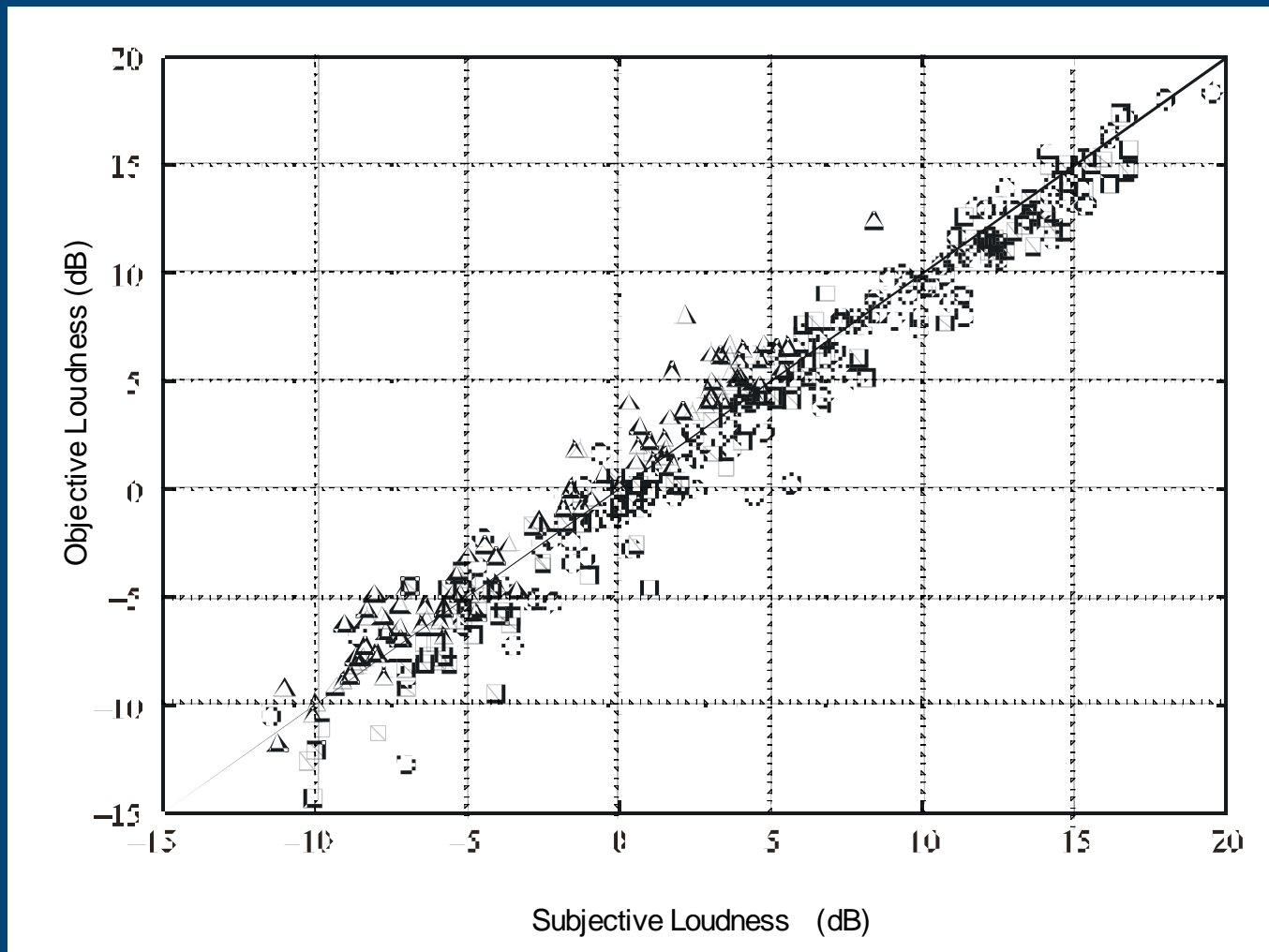
A Better Loudness Estimator (LeqA)



The Selected Loudness Estimator (RLB weighting)



Final ITU BS-1770 (multichannel) Loudness Meter



Loudness as a Single Number

- ITU BS-1770 measures loudness by integrating the loudness over an entire program, and reporting a single overall loudness value.
- If all program streams are normalized to a specific Loudness value, then listeners will not want to change the volume control.
- Simple gain changes will bring all programs to the desired loudness (a post-production process).
- This DOES NOT affect the dynamics or timber of the program.
- If this is desirable, then we have another Really Good Question...

Loudness control during Production

- How do you produce a program so that it matches the desired Loudness target value ?
- Develop a Short Term measurement that guides you to the desired overall loudness target
- ITU 1771 has an open question about the duration of a “short term loudness” measurement.
- The “electro mechanical acoustical” response time of the ear is about 100 ms
- Loudness Perception may require several seconds
- Somewhere between ? - We need help solving this

A Fishing Trip...

- Does Radio have any annoying operational problems ?
- Automatic Quality Control...
- Program Rendering...
- Anything else...

Program Loudness Control (and anything else that's bugging you)

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