

# System Design and Implementation

## A. AUDIO ANALYSIS.

1. Logarithmic analysis (old RTA), Human perception.
2. Linear analysis (FFT), Narrow Bandwidth.
3. FFT's parameters:
  - a. Sampling Rate.
  - b. Register of Time/ FFT size.
  - c. Function window/ Smoothing window.
4. Advantage and disadvantage of Linear.
5. Combining the best of...

Fix point per octave/ (Bob McCarthy method)

6. Transfer function (3 channels)
  - a. Ch. 1 Mixer.
  - b. Ch. 2 Processor.
  - c. Ch. 3 Microphone
  - d. F1 Speaker.
  - e. F2 Processor.
  - f. F3 Speaker and Processor.

## B. IMPULSE RESPONSE.

1. Amplitude.
2. Time.
3. Polarity.
4. Group Delay.
5. Reflections/ Echoes.

## C. PHASE.

1. Time Period.
2. Wavelength.
3. Phase equation.
4. Interference pattern.
5. Example: P.A. vs. Subs.
6. Phase Summation.
  - a. The Davinci Code™.
  - b. The Cylinder.
  - c. Phase graph reading.
  - d. Time fingerprint according to Phase display.
  - e. Polarity vs. Phase.
  - f. Examples of Phase summation.

## D. FILTERS.

1. Simplex:
  - a. Butterworth.
  - b. Linkwitz- Riley.
  - c. Bessel (Standard/ Rectified).
2. Complex:
  - a. Chebichev Type I.
  - b. Chebichev Type II.
  - c. Elliptic.
  - d. Wiseworks.

**3. Order Slope (Roll off vs. Phase shift vs. Impulse response vs. Group delay).**

- a. 1<sup>st</sup> Order.
- b. 2<sup>nd</sup> Order.
- c. 3<sup>rd</sup> Order.
- d. 4<sup>th</sup> Order.
- e. 5<sup>th</sup> Order.
- f. 6<sup>th</sup> Order.
- g. 7<sup>th</sup> Order.
- h. 8<sup>th</sup> Order.

**4. Crossover summation (Butterworth, Linkwitz-Riley, Bessel-standard/ rectified).**

**5. Alignment.**

- a. Speaker sensitivity (1W/1mt).
- b. Amplifier voltage gain (dB or X).
- c. Amplitude matching.
- d. Phase :
  - i . by delay electronically.
  - ii . by filter slope.
  - iii . practical examples.

**6. Blending systems.**

- a. Phase compatibility/ Group delay match.
- b. Phase equalizer:
  - i . how it works.
  - ii . parameters (Order, Q).
- c. Practical examples.

## **E. SUBWOOFER INTEGRATION.**

1. Level modification.
2. To Aux or not to Aux (L-R vs. Aux ...William Phasespeare)

## **F. SUMMATION OF CORRELATED AND UNCORRELATED SINGALS.**

1. Correlated 20xlog.
2. Uncorrelated 10xlog.
3. Practical example.

## **G. ROOM SUMMATION (ADDITION).**

1. Inverse square law (20xlog).
  - a. Practical example.
2. Directivity vs. Frequency.
3. Absorptive coefficient vs. Frequency.
4. Flat in the near field vs. flat at the mid field (to EQ flat or not to EQ flat?).

## H. CONSTANT Q (PRE LINE ARRAY) vs. PROPORTIONAL Q (LINE ARRAYS).

1. Directivity plots.
2. Principles of splay:
  - a. Constant splay (Constant Q).
  - b. Progressive splay (Proportional Q).
  - c. Splaying vs. Directivity (low frequency coupling vs. high frequency isolation).
3. Principles of tapering (shading).
  - a. Gain change (is it a sin???)
  - b. High frequency EQ (is it forbidden???)
4. Low frequency built up correction.
5. Array at -3 (10xlog) or -6 (20xlog) ? (Breaking the inverse square law ..... J.P)
6. Advance splay techniques.
  - a. Progressive splay.
  - b. 606 splay.

## I. PLAN YOUR JOURNEY WITH A MAPP AND A COMPASS.

1. Please Preinstall...
2. Mapp on line pro and Compass at glance.
3. Mapp on line Pro:
  - a. Data base.
    - i . the truth beyond the myth.
  - b. Your personal anechoic chamber.
  - c. Introducing your venue to Mapp on line pro.
  - d. Having fun.
  - e. Practical examples.

#### 4. Compass:

- a. Blue or Red pill.
- b. Signal flow.
- c. Short cuts.
- d. Grouping.
- e. Copy and Paste.
- f. EQ in three flavors.
- g. Array correction, High frequency correction.
- h. Snapshot and Project.
- i. EQ in or EQ out?
- j. Unity gain compensation.
- k. Practical examples.

#### J. BACK TO THE FUTURE (MEET HARRY OLSON).

- 1. Directivity control by straight lines.
- 2. Directivity control by curvilinear lines.
  - a. Physical.
  - b. Electronic.
- 3. The end Fired !!!
- 4. The true cardioid (gradient).
- 5. The other cardioid.
- 6. Mixing all together (Flown or stacked/ Horizontal or Vertical).
- 7. Geometry of room vs. 1-2-3.
- 8. Practical examples.
- 9. Pro and Cons of ... Technicolor (....1-2-3).
- 10. Phase align to the P.A.