stage accompany

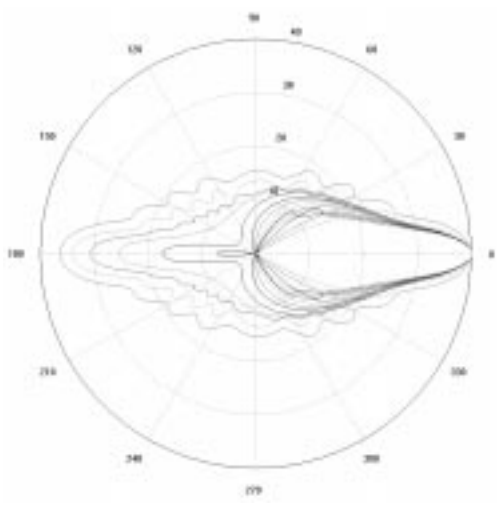
NEWTON SYSTEM - DESCRIPTION

High quality sound reinforcement has always been a difficult task in the many acoustical environments existing. The final result of the sound intelligibility is an outcome of acoustics, engineering qualities and ... sound equipment used, making it a very difficult thing to predict.

Although the current idea of physically directing cabinets is useful under many circumstances, there are many acoustical environments that require a more dedicated approach to get the best possible sound intelligibility. Large spaces, like halls, stadiums, etc. are very often not designed to offer a great listening environment (to say the least), resulting in long reverb times, making high demands on the sound system design. Too much "waste" of the reinforced sound, reflected by walls, or other non-absorbing structures, will influence the (intelligibility of the) direct radiated sound. In order to prevent this, total control over the sound dispersion/directivity is essential.

As main item in the sound reinforcement industry, constant development in horn- and array technology has brought a great improvement in dispersion/directivity control over the years. However, the traditional principle of mechanically aiming the loudspeaker cabinets is reaching it's limits.

Now directivity control has been taken a giant step further



A sound system has been designed, making a fully predictable performance possible, under any acoustical circumstance. This unique sound system has been developed by Johan van der Werff from acoustical consultancy Peutz and Stage Accompany, manufacturer of professional sound systems.

The applied principle of this system, called "Newton", is electronically aiming of the dispersion, or "lobe", (with a fully variable dispersion) instead of the thus far used mechanically (physical) aiming of cabinets (with a fixed dispersion). The cabinets of the Newton are always hanging straight down/vertical, hence the name (gravity).

"Newton" is a modular 3-way concept, consisting of loudspeakers, amplifiers and a multi-channel DSP;

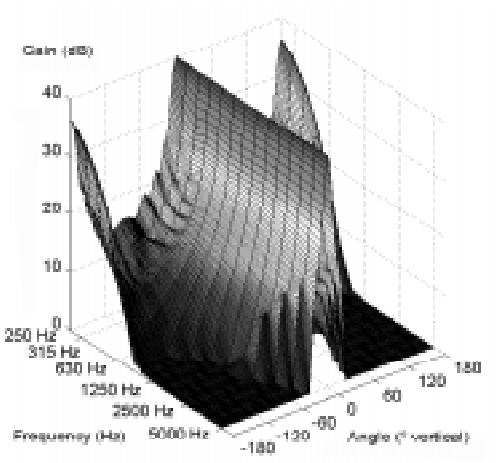
- For HF, SA 8535 Ribbon Compact Drivers are used, covering the frequencies from 2.5 kHz. to 30 kHz. Each RCD features the AIR™-system, for increased power handling of 120W/2.000W (cont./peak). The RCD's have a 70 x 40 wave-guides and are mounted on the MF columns.

- For MF, speaker columns are used, for the frequencies from 250 Hz. to 2.5 kHz. Each column consists of 9 pcs. "line-arrayed" 6" high-power speakers. The wave guide is made of "see-through" poly carbonate. Power handling is 9x 1.000W. Depending on the location of the column/distance from the acoustic center of the system, these 9 speakers are controlled individually or coupled in 2-, 3- or more configuration.

- For LF, front-loaded bass cabinets cover frequencies from 40 Hz. - 250 Hz. The cabinet features twin SA 1513 15" loudspeaker chassis. Power handling is 2.000W. max.

The configuration with amplifiers, DSP channels and the total number of loudspeakers is depending on the size and shape of the "projected area".

Every loudspeaker in the system is individually controlled, with a new developed algorithm for filtering of time/phase and frequency response, by the 48 channel DSP processor/interface.
By feeding each speaker a dedicated signal, dispersion of the column can be changed from -20 to + 20 degrees vertical (horizontal dispersion is 90 degrees). Therefore sound can be "projected" on the places where the sound needs to be, preventing unwanted reflections.



By using multiple columns (extending array length), multiple lobes can be created, each directed in a different, fully adjustable angle. So not only shape of the lobe (dispersion) can be adjusted, also the location of the lobe (projected area) can be controlled.

Because of the efficiency of this approach and the modular concept (each MF/HF unit is 5ft./1.5m.), the whole sound system is very compact and easy to transport in a small truck!

For example

An example of a Newton application was a (pop)concert, held in the Amsterdam Arena, beginning of October.

In this 57.000 seat stadium, with a 9 second reverberation time (empty). an SPL was needed of 100+ dB. (direct sound) average on every seat.
Additional requests were; A central placed stage; no speakers in the sight lines; perfect (speech) intelligibility, with sufficient and equally dispersed sound pressure on every seat (2 rings + arena).

The "Newton" system designed for this task consisted of;

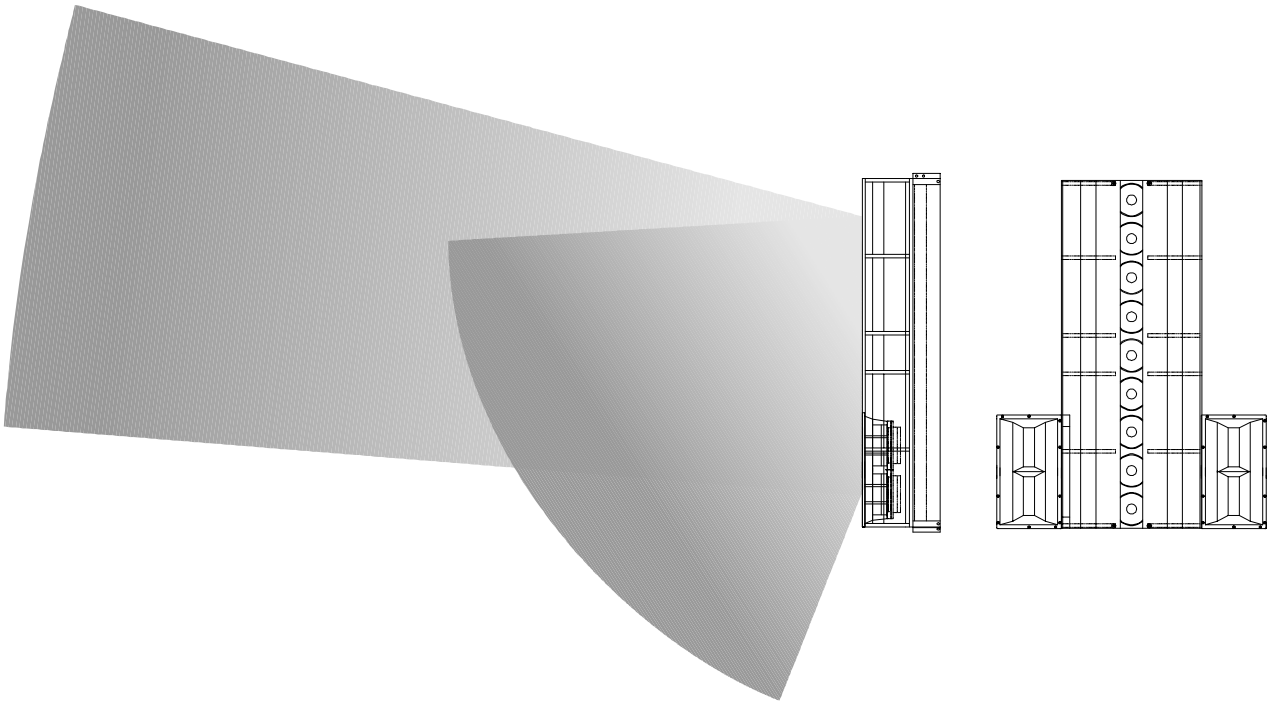
- 4 MF/HF units (per column) on every corner around the stage (4 columns), for the arena and the first ring; Total length per column 20 ft./6 m.
- 5 MF/HF units (per column) on every corner (also 4 columns) for the seats on the highest ring (± 33ft./10m. above the lower columns). Total length per column 25 ft./7.5 m.
- 1 LF column, centrally flown between the MF/HF columns, consisting of 17 B 30 enclosures (each with double SA 15") with a total length of 66ft./ 20 m.
- As "front-fill" 12 pcs. SA C 27, arrayed with 30 degrees under the stage floor.

Total number of amplifier channels was 61. The directivity caters for a very low power consumption of the amplifiers; During this concert only 20kW. of AC power was used. (AC power supply was overrated with 3x 63amp. max.!)

In general bad intelligibility (+ complaints!) occurs at ALcons worse than 15% (STI 0.45); In dome shaped stadiums, like the Amsterdam Arena, these figures very often exceed 35% (STI < 0.3). (the lower the ALcons/the higher the STI, the better intelligibility will be).

Under the mentioned circumstances, the Newton system stayed well below ALcons 10% (STI ± 0.5), due to the controlled directivity of the system (no reflections), supplying a perfect sound-intelligibility on all frequencies. A good indication of how well the system was designed, was the 40 degrees vertical coverage angle at 80 Hz.! Where normally this frequency is seen as "omni-directional"!

With the “see-through” wave guides, Ribbon Compact Drivers for the high frequencies and the lean shape of the columns (± 8 in./20cm. wide) the total speaker system was hardly visible, yet it produced 103 dB on every seat.



The basic idea of the initiative for the Newton system is the understanding of speech intelligibility and the knowledge of electronically controlled loudspeaker arrays. Johan van der Werff from Peutz and Philip de Haan and Jeroen Fortanier from Stage Accompany developed a sound reinforcement system, with a completely predictable and controllable response behavior under any acoustical circumstance with the use of a complete new algorithm/software control principal.

By this a perfect speech intelligibility and music response is obtained at a high and equally dispersed sound pressure in even the most difficult acoustical environments.

Realized projects (like above-mentioned Amsterdam Arena) have shown that with this new technology, in combination with a dedicated design for the application, a quality of sound reinforcement can be realized, that could not be achieved before.

Due to the necessary expertise and dedicated approach, the Newton system will currently be for rent only.