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Dazzle Power Logical Extended Surround Interface a New Evolution in Multi Channel Audio Professional Theatre System

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Abstract- *DPLESI is a multi channel audio professional theatre system which enables the complete range of audio frequency in multi dimensional mode. The complete range of audio frequency can be experienced by its stunting 16 output powered columns. A wide range of equalizer allows the selection of desired frequency range. The security access keeps the system safe and secured.*

Keywords- *Audio spectrum, Digital audio, Music experience, Subwoofer, Surround.*

I. INTRODUCTION

DPLESI system provides the best surround sound experience around the 360° sound field. It provides a forward perspective of the sound field to the listener by sound localization using multiple discrete audio channels connected to an array of columns. It creates an audio-environment for all sorts of purposes. The function of the center channel column is to anchor the audio signal. The subwoofers provide the bass management by handling and directing the bass content in the audio signal. It provides the extreme low sub bass. The low frequency effects are handled by the power woofers which is large in size. All the columns all together create an illusion of the sound field into a 3D mode.

II. DPLESI

The system has 16 channel input at single mode and 32 channel input at multiple modes. It has 16 output lines which can be extended to 32 output lines under the logical extended mode to get each of the small signal dimensional audio. The system consists of 32 in hand equalizer with a multiplier of X8 covering all main frequencies from 22 Hz to 18.5 KHz. The multiplier multiplies the normal frequency either low, high or mid range into the nearest range as per the requirement. The wide range of personalizes makes the audio to be heard in the specification as required. It includes many modes like club, stadium, hall, pub, auditorium and surround.

Different drivers are used in the column to reproduce different frequency ranges. For very low frequencies subwoofers are used, for the reproduction of the lowest part of the audio spectrum which is below 80 Hz. The subwoofer aperture does not need to be faced to the listener because in this frequency range sound can easily bend around corners by diffraction. For low frequencies woofers are used. To produce this with the woofers appropriate enclosure design is made. For middle frequencies mid-range speakers are used. It can be direct radiation drivers which is mounted on the front baffle of a speaker enclosure or compression drivers which is mounted at the throat of a horn for the control of radiation pattern. For high frequencies tweeters are used. A dome tweeter, ribbon tweeter or horn-loaded compression driver can be used for high frequency reproduction. Ribbon tweeter is best because its output power is wide in the horizontal plane. For the highest audible frequencies super tweeters are used.

The system is made to security concerned too, having security key and security card. The power access to the system is made by inserting the security key and operation access by inserting the security card. DPLESI is the right choice if one is looking for a home theatre system to enjoy all the power, quality and experience of rotational hyper blasting music experience.

III. SCOPE OF APPROACH

Due to a rapid change in the technology the musical system which evaluated from mono to stereo then digital 2.1, 4.1, 5.1 and 7.1 had made a difference of enjoying music. The 16 output lines of DPLESI create a virtual effect of music in life. The key concept on making of this latest digital system is to keep oneself free from all tensions and make them feel above the zenith when enjoying music. It is uniquely designed to provide crystal clear audio according to the latest audio requirements. This includes security access, control access, customized equalizer setting and modifiable re- engineering access in the system.

IV. METHOD

DPLESI has multi device compatibility and is controllable by computer system. It can be integrated and remodeled for various

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functions in audio application. The four stage formula behind the designing of DPLESI was product specification, system design, application development and testing. It has evolved from years of designing and implementation. Advanced quality control and continuous research were done to ensure the best quality of music. The development was divided into various phases, carefully chosen to make the entire system scalable to the future needs and requirements. It was done by estimation, analysis, designing, implementation and finalization. At the completion of each phase the system was tested to the appropriate level.

The system uses vibrator technology which is a comprehensive application on sound engineering to deliver maximum bass with thundering effect. The very low frequency signal is filtered and given to main woofer and subwoofer is applied with a changed signal frequency. A power speaker is also used to get the strong thundering effect. The vibration of sound waves is delivered by sub line using the woofers and speaker enclosed in a 4 feet column with air vent. Thus along with the maximum power delivery capability at very low frequency and vibration motion of audio power, DPLESI provides a clear cut audio clarity using its 16 output lines covering all the frequencies of audio range. Figure 1 shows the functional diagram of DPLESI.

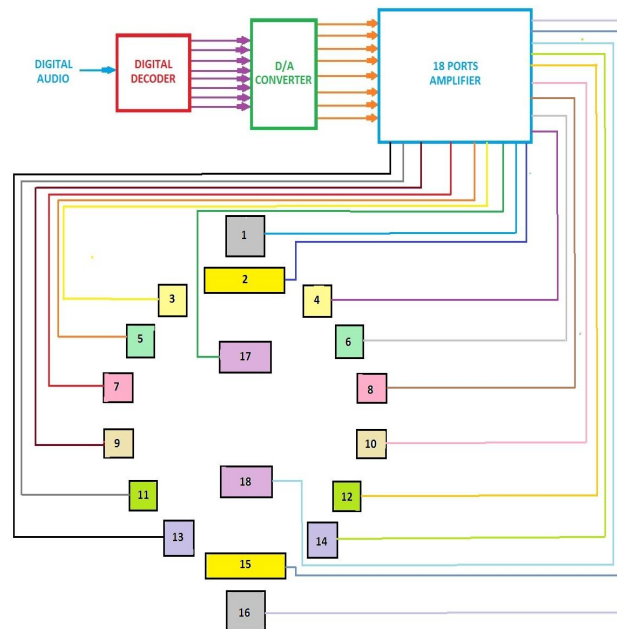


Fig. 1 DplesI

The 18 columns are designed in such a manner to give the wide range of audio frequencies with thundering bass, empowered sound and crystal clear clarity. The main column which is 4 feet in height, 2 feet in breadth and 1 ½ feet in width is designed using vibrator technology consisting of two 12" front woofer and one 10" front sub woofer to get a thundering and powerful vibrating bass. The other columns are in various size consisting woofers, sub woofers, speakers and tweeters from a maximum range of 10" to minimum of 2".

To cover the entire audio frequency range without the help of drivers a full-range speaker is used. It has an additional cone called a whizzer which extends the high-frequency response and broadens its high frequency directivity. A crossover is used to separate the incoming signal into different frequency ranges and to route them to the appropriate driver. It makes the drivers to receive power only in the frequency range they were designed for, thereby reducing distortion and interference. The efficiency of a speaker is the sound power output divided by the electrical power input. Proper impedance matching along with accurate enclosure design makes the speaker to produce more acoustic power. Apart from this a significant factor in the sound of a speaker is the amount of absorption and diffusion in the surrounding area. Directivity also affects the frequency balance of sound which a listener hears. In audio system design the logarithmic relationship between the power and the perceived loudness is an important factor. The amplifier power and the speaker sensitivity affect the maximum realizable loudness. Speaker sensitivity varies with frequency and power. Professional speakers have sensitivity between 90 dB and 100 dB.

The column system consists of the following:-

- A. Center woofer column.
- B. Center column.

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- C. Front LS column.
- D. Front RS column.
- E. Front Left column.
- F. Front Right column.
- G. Satellite 1
- H. Satellite 2
- I. Satellite 3.
- J. Satellite 4.
- K. Rear Left column.
- L. Rear Right column.
- M. Rear LS column.
- N. Rear RS column.
- O. Back column.
- P. Back woofers column.
- Q. Ceiling Front half column.
- R. Ceiling Rear half column.

The output and input connections are through A/V ports so that there is an ease for plug and play. The 32 input lines are shown in figure 2. More ever many multi input and multi output ports have been used to make the system free from mesh of wires. Proprietary connectors are also used to combine several different wires into one connector. It is done to reduce cable clutter and for the ease of installation.



Fig. 2 32 lines Input

To prevent the system to be used or make any changes in the system settings by any unauthorized person, security modules comprising security key, card and power on card were used. The security section is shown in figure 3.



Fig. 3 Security section

The system consists of multi pre and power amplifiers which are designed used ICs, power transistors and mosfets. Proper impedance matching is implemented to drive the whole unit without considerable power loss. Digital Signal Processors are used for creating various presets and audio effects such as hall, arena, stadium, pub etc to replicate the sound as if the audio were being played in these places. Equalizer allows controlling the tone of the sound. They can be graphic equalizers or parametric equalizers. Graphic equalizers use faders which are used to boost or cut specific frequency bands. Parametric equalizers are built into each channel comprising knobs which can be selected to cut or boost frequency bands. A high-pass and low-pass filters are also included on equalizers to restrict a channel's bandwidth extremes. The parametric equalizer allows the user to vary and select from a wide range of audio frequencies. It is separated to:-

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- A. Very low frequency.
- B. Low frequency.
- C. Mid range frequency.
- D. Semi range frequency.
- E. High frequency.
- F. Very high frequency.

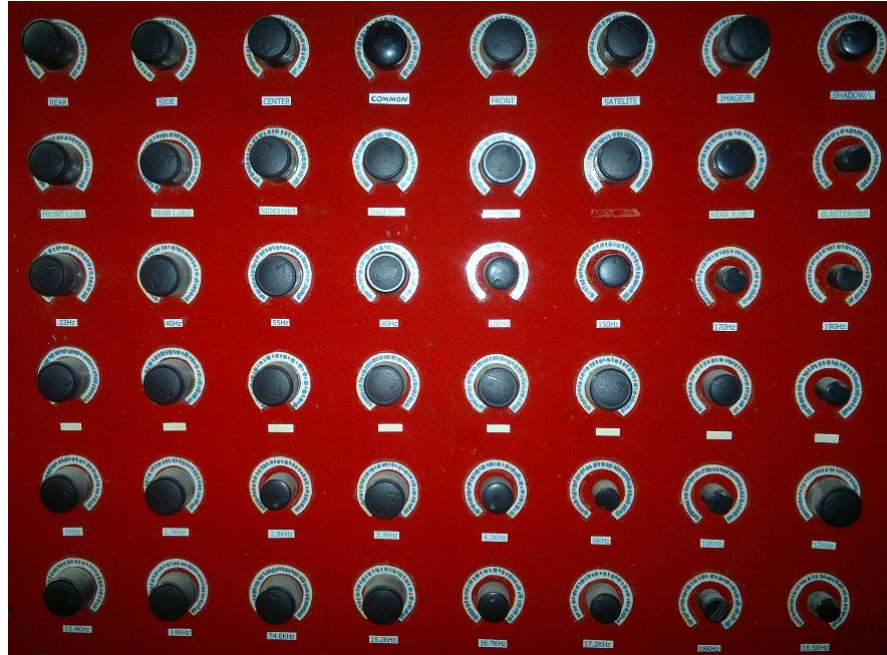


Fig. 4 Volume control and equalizer

In single mode there are 32 in hand equalizer and under multi mode 256 when used in frequency multiplier mode. Figure 4 shows the volume control and parametric equalizer section. A wide range of personalization can be done using the personalize system which allows setting the audio in rock, movie, ambience, wide, hall, ballad, stadium effects. Noise Criteria are the noise-level guidelines which are applicable to perfect audio systems. It is the measure of a room's ambient noise level at various frequencies. An ambient sound level of NC-30 or less is best because it helps to retain the dynamic range of the system.

The visual display consists of 7 segments LED, LCD, meter and 3D display units to identify various functions selected and also to enjoy the visual display of music. It allows the user to identify the working of system in different modes like channel specification, driving source, security display, power spectrum etc.

Since the system has 16 channel input under normal mode and 32 channel input under multi mode, different signals can be applied to the input and desired amplified output can be received from it. Figure 5 shows the complete panel of DPLESI. The various input stages before an audio power amplifier consists of pre-amplifier, equalizer, tone controls and mixing circuits. The key design parameters for the audio power amplifiers are gain, frequency response, distortion and noise. An amplifiers power gain depends not only on the source and load impedances, but also with the voltage and current gain. Proper power supply must be considered in the design because it will influence the output. Due to the heat generated by power amplifiers adequate heat sink and air cooling system should be used.

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Fig. 5 Dplesi panel

TWO CONDUCTOR COPPER WIRE MAXIMUM WIRE LENGTHS		
WIRE SIZE	4 Ω LOAD	8 Ω LOAD
22 AWG	6 ft	12 ft
20 AWG	10 ft	20 ft
18 AWG	16 ft	32 ft
16 AWG	24 ft	48 ft
14 AWG	40 ft	80 ft

Table 1 Maximum Wire lengths

The system also consists of radio frequency transmitter to transmit the audio signals in a desired range. Multicolor LED is located all over the system which displays each function when in use, using red, green, yellow, blue and white LED. To manage the dynamic range of an audio signal, compressors are used. It reduces the gain of a signal which is above a defined threshold level by a defined ratio. The resistance, capacitance and inductance of speaker wire have a great effect on its performance. A thicker wire reduces the resistance. The speaker wire resistance should be kept less than 5% of the speaker's impedance. The maximum wire lengths are shown in table 1. Due to capacitance, loss called dielectric absorption takes place. To keep audible

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losses below 1%, the total capacitance in the cable should be kept below 2,700 pF. The other factor to be considered is the inductance. The total inductance in the cable should be kept below 2 μ H to keep audible losses below 1%.

V. CONCLUSION

DPLESI system along with its wide functions and capabilities will create a new era in the audio industry. It can be used in professional as well as personal application and it will change the way of consumption of audio. The clarity and feel of multi dimensional audio will rejuvenate a person's life. It will provide a deep impact in realistic audio experiences.

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