Development of Multichannel Surround Technology for Cars

Hideki Matsui
Yuji Tomita
Shigeki Kato

Abstract

Generally with the assembly of multichannel surround systems in an in-car environment, the addition of center speakers and woofers are necessary, which present a burden from the perspective of mounting and cost. Thus in order to solve these problems, technology was developed to achieve multichannel surround at a reasonable cost.

This technology is a fusion of new surround technology at SRS Labs, Inc: Circle Surround II, and Rear Mix processing, our company’s original technology for application in the in-car environment.

With Rear Mix processing, it is possible to solve playback sound field bias due to the seat occupied, a problem with the in-car environment, as well as acoustic oscillation in the forward/back direction during FM broadcast reception with a weak electric field while in driving.

It becomes possible to enjoy multichannel surround simply and at low costs by building this technology into AV systems.

In this paper, we will describe issues related to the realization of an in-car multichannel surround system, the solution of these issues, and the technological investigations and process of commercialization.
2.1 What is The multichannel surround system?

The sound field is biased back and forth and around depending on the where one is seated.

Installation of a center speaker and woofer is difficult.

The speaker position is low.

2.2 Issues arising from differences between the home environment and the in-car environment

a. The sound field is biased back and forth and around depending on the where one is seated
b. Installation of a center speaker and woofer is difficult
c. The speaker position is low
2.3 Selection of a car-fitted multichannel surround system

The selection of a car-fitted multichannel surround system involves considering various factors such as the car's interior space, the position of the speakers, and the desired sound quality. It is essential to choose a system that can accommodate the car's interior without compromising the overall aesthetic and functionality of the vehicle.

### CSII technology and issues with car installation

#### 3.1 Features of CSII

1. **SRS Circle Surround decoder**
   - Provides a circular surround sound experience similar to a theater environment.
   - Enhances the immersive sound experience by creating a 360-degree sound field.

2. **Additional function 1: SRS TruBass**
   - Increases the bass level without affecting the clarity of the audio.
   - Enhances the bass response to create a more powerful and immersive sound experience.

3. **Additional function 2: SRS FOCUS**
   - Enhances the focus and clarity of the audio.
   - Creates a more defined and focused sound experience.

#### 3.2 Issues with car installation of CSII

When installing CSII in a car, several issues may arise, including space constraints, electrical connections, and compatibility with existing systems. It is crucial to consider these factors to ensure a smooth and effective installation process.

_Sources: Fujitsu Ten Tech. J. No. 24 (2005)_
4. Realization of car-fitted CSII

4.1 Hardware configuration

4.2 Optimization of algorithms
The commercialization of an car-fitted CSII built-in device, and evaluation of the product

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Summary and future outlook

A summary of the developments in the field and the future outlook is presented. The authors discuss the current state of in-car audio systems and highlight the advancements made in the field. They also outline the future directions and potential innovations in this area. The diagrams illustrate the concepts discussed in the text. Profiles of the writers are also included, providing insights into their backgrounds and contributions to the field.