

A study on the Improvement of Klaxon Sound

Zhixing Tian¹, Bong-Young Kim² and Myung-Jin Bae^{3*}

¹Soong-sil University, Department of Information and Telecommunication Engineering, Seoul, 06978, Korea.
Orcid Id : 0000-0003-3882-2459

²Soong-sil University, Department of Information and Telecommunication Engineering, Seoul, 06978, Korea.
Orcid Id : 0000-0002-3553-039X

³Soong-sil University, Department of Information and Telecommunication Engineering, Seoul, 06978, Korea.
Orcid Id : 0000-0002-7585-0400

Abstract:

In modern society, cars have become the main means of transportation. Cars have brought great convenience to our lives, but the problem of klaxon sound causing psychological stress and causing retaliatory driving has always existed. In order to solve these problems, Sori Sound Engineering Research Institute (SSERI) has developed a rhythmic klaxon sound. It is produced by changing the existing klaxon output power and working time. It has a good effect of preventing retaliatory driving. Combines the advantages of existing klaxon sound and rhythm klaxon sound. The improved klaxon system that can be freely switched between the two sounds according to different situations is designed. That is, output the rhythm klaxon sound in non-emergency situations and output the existing klaxon sound in a sudden emergency. This improved klaxon can not only relieve the pressure of pedestrians, but also has a good early warning effect.

Keyword: rhythm klaxon sound, existing klaxon sound, psychological stress, noise problem, Social problem, retaliatory driving, improved klaxon

1. INTRODUCTION

Cars are an indispensable necessity in modern life. cars all has a klaxon system that alerts people around the car in emergencies. Klaxon was created 100 years ago. However, because of the simplicity of klaxon, there was no progress. Existing klaxon sounds produce the same sound regardless of the driver's intention. The existing klaxon sound level is very large and very noisy to hear, which can cause discomfort and stress to the listener. As the number of cars increased, the klaxon sound became more frequent, and retaliatory driving by the klaxon sound became a social problem. Since most of the retaliatory driving causes are loud klaxon sounds, klaxon sounds need to be improved [1].

The Sori Sound Engineering Research Institute (SSERI) has developed a rhythmic klaxon sound with a cheerful sound to eliminate the discomfort caused by the existing loud klaxon sound. Contrary to the continue loud noise from the existing klaxon, the newly developed rhythm klaxon sound does not make the listener feel uncomfortable, because it changed the size and duration of the sound. However, although rhythmic klaxon sounds can prevent retaliatory driving, it is necessary to listen to existing klaxon sounds that alert the listener at risk. Especially in an emergency situation where a pedestrian suddenly jumps into a roadway or the vehicle next to it is forced into a road, the existing loud klaxon sound must be heard to remind the people that the situation is urgent [2][3].

In this study, using a single klaxon, we propose a compatible klaxon which can output the existing klaxon and rhythm klaxon sounds according to the situation. In Chapter 2, we compare and explain the existing klaxon sounds and rhythm klaxon sounds. In Chapter 3, we describe the method of outputting two sounds using the electronic horn. Chapter 4 concludes.

2. THE SOUND CHARACTERISTICS OF THE EXISTING KLAXON SOUND AND RHYTHM KLAXON SOUND

2.1 Sound analysis of existing klaxon sound

In daily life, when a car encounters an emergency while driving, it must immediately remind others. The existing klaxon sound suddenly output loud sound on the pedestrians, allowing pedestrians to quickly detect danger and react.

When the handle switch pressed, the circuit is energized, and the current flows into the electromagnetic coil of the electric horn, causing the metal diaphragm to vibrate and produce an audible sound. When the switch is released, the metal diaphragm vibration stops, and the sound stops. So what people often hear is a continuous loud sound (Da...). The sound waveform of the existing klaxon sound is shown in Figure 1.

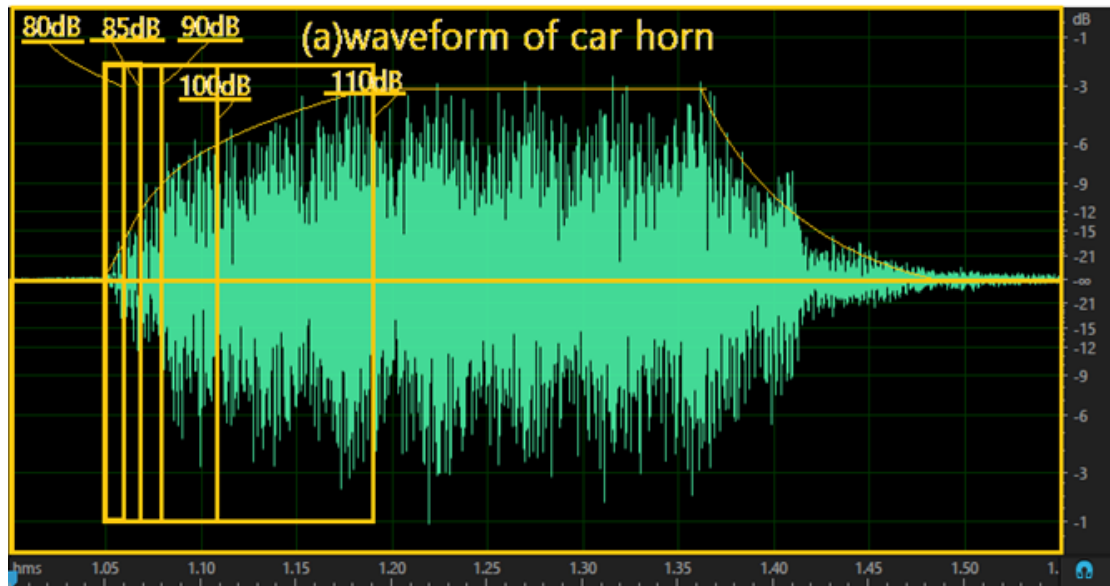


Fig 1. Wave form of existing klaxon sound and power level(dB)

It can be seen from the figure 1 that the amplitude of the existing klaxon sound increases sharply in a short time and the final balance is at the maximum value, and this sound will more than 110 dB. The sudden loud sound sent to the human ear directly brings a feeling of loud sound shock, which causes great pressure on the human and brings discomfort, which maybe causes pedestrians feel resentful and trigger retaliatory behavior [2][3].

2.2 Sound analysis of rhythm klaxon sound

Rhythm klaxon sounds can be created by installing a Power controller to adjust the working time, pause time and output power of klaxon. The power supply duration (working time) is divide into 5 levels, and the next level is twice the previous level, and the sound pressure level of the Klaxon sound was set to 5 levels (80dB,85dB, 90dB, 100dB, 110dB). The division method shown in Figure 1. Forms a rhythmic sound. people can hear a sound that is rhythmic and the intensity of the sound is increasing. The sound waveform of the rhythm klaxon sound is shown in Figure 2.

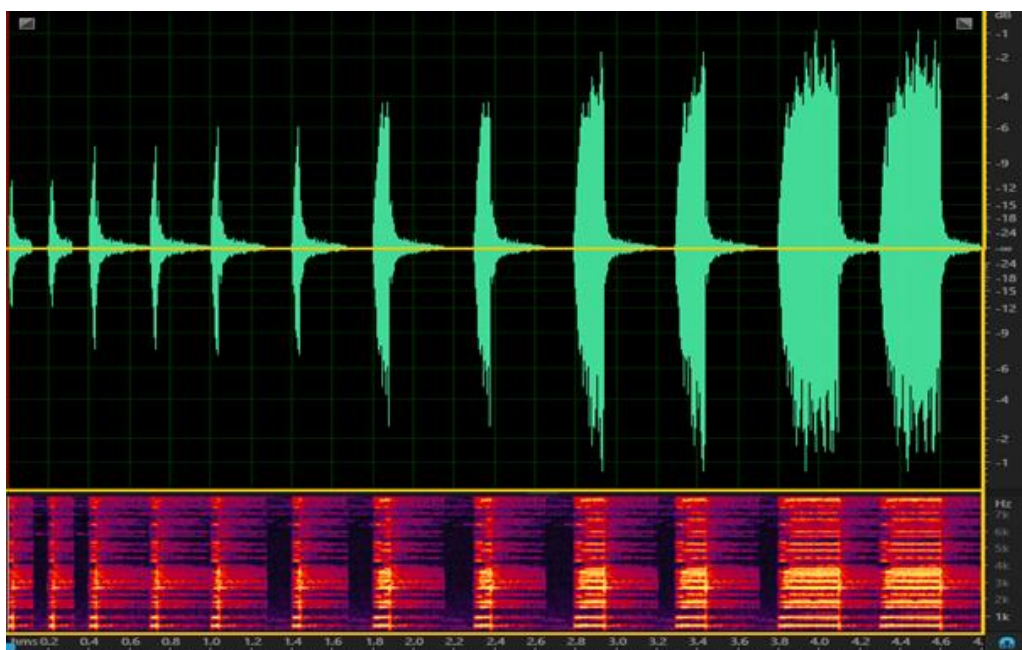


Fig 2. Wave form of rhythm klaxon sound

As can be seen from the figure2, every two wave forms are the same. The time width of two different wave forms is doubled, and the time interval between two different wave forms is increased by 0.01 second. The amplitude of the waveform is also gradually increasing, but the degree of increase is gradually decreasing. So people hear the sound that is intermittent, and the interval is getting shorter and louder. The sound becomes rhythmic. And the rhythm klaxon sound solves the problem that existing klaxon sound directly conveys a large sound of more than 110dB to pedestrians. It can spread sound from weak to strong and spreads it to pedestrians in stages, which greatly reduces the psychological pressure [4][5][6][7].

3. PROPOSE A COMPATIBLE KLAXON SOUND SYSTEM

The two klaxon sounds have different sound characteristics. Existing klaxons put a lot of pressure on pedestrians, but in an emergency, this pressure can also translate into a force that allows pedestrians to react quickly. rhythm klaxon sound can spread sound from weak to strong and spreads it to pedestrians in stages. which reduce the psychological pressure brought by the loud voice, make the klaxon sound more acceptable to

pedestrians. Therefore, the improved klaxon system that can be freely switched between the two sounds according to different situations is designed. [8][9].

In the study, the rhythm klaxon sound can cause more little psychological stress on pedestrians, it is designed to be used in non-emergency situations. The driver only needs to press the button twice within 0.1 seconds and keep pressing. The circuit of the rhythm klaxon sound can be activated, so that the klaxon emits a rhythmic sound to remind the pedestrian. But because when it comes to an emergency, the warning effect of rhythm klaxon is not enough to warn others. So existing klaxon sound is needed that can be used as a klaxon sound in an emergency. But when it comes to an emergency, the warning effect of rhythm klaxon is not enough to warn others. So existing klaxon sound is needed that can be used as a klaxon sound in an emergency. Same as the existing startup method, just press and hold the handle switch to make the existing klaxon sound [10] [11].

So, a control circuit that can control the conversion of these two sounds is needed. The control circuit of the variable sound klaxon is shown in Figure 3.

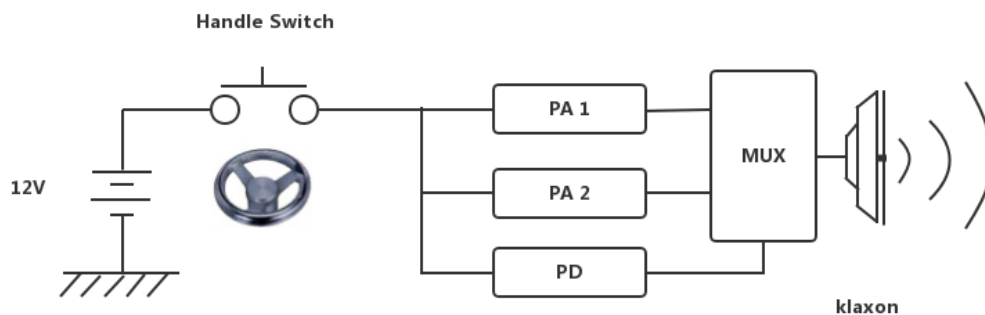


Fig 3. The control circuit of the variable sound klaxon

PA 1: Existing klaxon circuit power amplifier

PA 2: Rhythm klaxon circuit power amplifier

PD: pulse detector

MUX: multiplexer

As shown in Figure 3, the handle switch is connected to a main line, and that is divided into three branches. The first one is to generate the sound of the existing klaxon, and the power amplifier (PA 1) is used for power amplification. The second is to generate the sound of the rhythm klaxon. The power is amplified by using a power amplifier (PA 2) that can be adjusted. The third is a pulse detector (PD), that detects the current pulses that the switch is closed and open. These three branches are finally connected to the multiplexer. The first branches and second branches are used as inputs, and the output of the pulse detector acts as the control end of the multiplexer [12] [13].

When a current pulse is detected (press the handle switch once), the multiplexer selects the first branch as the input and the existing klaxon sound as the output. When two current pulses are detected in 0.1 second (press the handle switch twice in 0.1S), the multiplexer will select the second branch as the input and the rhythm klaxon sound as the output [12] [13].

The method of controlling the sound generation of different klaxon sound is to detect the voltage value in the circuit by using PD within 0.1 seconds. When the switch is pressed, the switch is set to 1, and the klaxon sound is set to 0. After 0.05 seconds delay, the voltage value is detected in the PD. If the switch is still 1, the existing klaxon sound is emitted and then returned to the previous delay to form the first cycle. If the switch becomes 0, continue to check the voltage value after 0.05 second delay. If the switch is still 0, the sound stops and ends. If the switch becomes 1, rhythm klaxon sound is emitted, and then the return to the previous delay end constitutes the second cycle. The specific control implementation process is shown in Figure 4[12] [13].

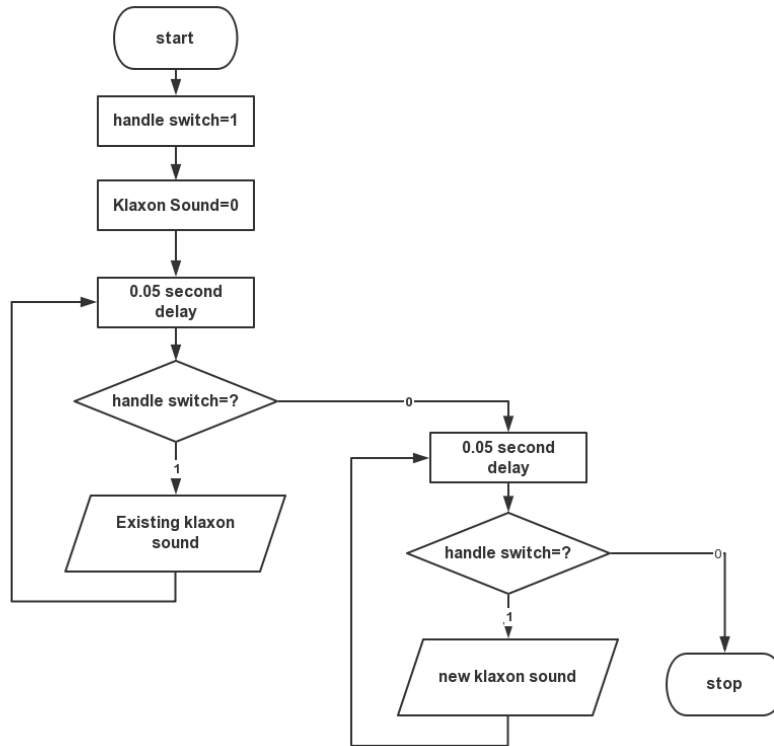


Fig 4. A flow chart of the method for converting the klaxon sound generation

The final output sound pattern is different depending on the way the switch is pressed. Can be divided into two ways [12] [13].

The first type, starting from time $T=0$, presses the switch twice and holds it within 0.1 second. The switch input and sound output are shown in Figure 5.

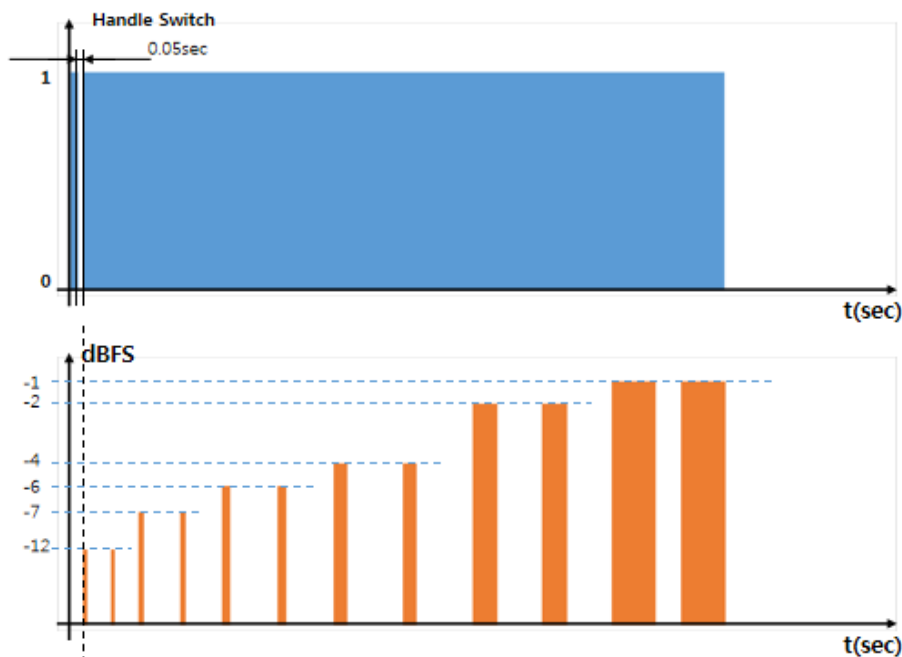


Fig 5. The input and output in the first mode.

Second, press and hold the switch, release the switch at any time, then after press the switch again within one second, hold it. The switch input and sound output are shown in Figure 6.

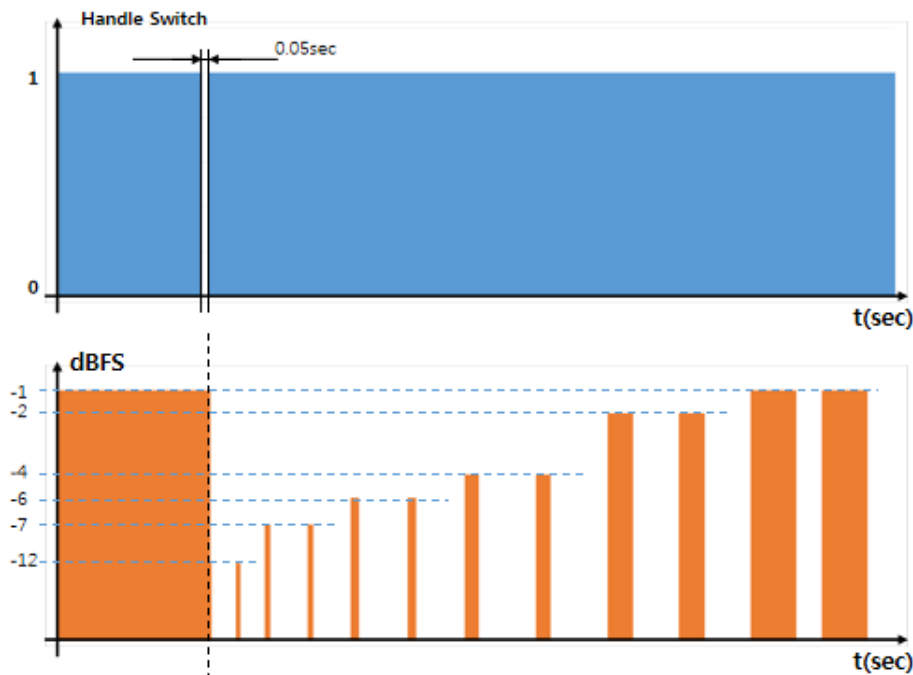


Figure 5. The input and output in the second mode.

4. CONCLUSION

Since the commercialization of klaxon began more than 100 years ago, there has been no progress due to its structural simplicity. Therefore, the fact that such a klaxon has caused psychological stress and dislike has always existed and has not been improved. In order to solve the noise pollution and retaliatory driving social problem caused by the existing klaxon, SSERI has developed a rhythm klaxon sound to prevent retaliation. The rhythm klaxon sound developed by SSERI has the effect of preventing retaliation by giving a rhythm to the duration time of the klaxon sound and outputting a friendly sound. However, rhythm klaxon sound is somewhat inadequate to signal a sudden crisis.

In this study, an improved klaxon was proposed. By using rhythm klaxon sound to prevent retaliation driving, and to output an existing klaxon sound if necessary to inform an emergency situation. The improved klaxon offers two kinds of sound output. First, press the handle switch twice within 0.1 seconds to output a rhythm klaxon sound. Second, hold down the handle switch and output the existing klaxon sound. How to select and output the klaxon sound according to the operation of the handle switch is shown in Figure 3 and Figure 4. If you output the existing klaxon sound and then release the handle switch momentarily and press it again, the klaxon sound is output as shown in Figure 6. In this way, the improved klaxon can switch between existing klaxon sound and rhythm klaxon sound according to the situation.

The improved klaxon is based on the existing klaxon and has two effects of preventing retaliation driving and reporting an emergency. Therefore, the improved klaxon proposed in this study can be said to be effective in solving social problems both practically and economically.

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