Expression Distortion Pedal for Electric Guitar

Project Code: MM3-10
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OVERVIEW

Introduction

Nowadays, guitar effects unit are widely used by guitarists all over the world. In order to create the special sound effects, musicians usually own one or even more effect pedals. Overdrive/Distortion is the most common type of effect. However, most of the Overdrive/Distortion pedal cannot make a gradually high gain sound from a clear tone. As a guitarist myself, it is not convenient for me to produce a smooth transition from a clear sound to an overdrive sound.

Aims and Objectives

In order to tackle this problem, I would like to design and develop a new product with a foot treadle analog effect pedal, such that users could tune the gain by stepping on the pedal. This would make it easier to control the distortion level of the pedal. Here is the system block diagram which shows the connection between guitar, effects unit and amplifier.

METHODOLOGY

Design Phase

In order to tackle the transition problem in distortion effects unit, I would like to make use of Wash-Wash pedal (see picture) to design a new circuit. By using the Wash-Wash foot treadle pedal, it is easier for us to change the gain level of overdrive (from 0%-100%, 0% means acoustic clear tone, 100% means maximum gain level with hard overdrive tone). Therefore, we can get a smooth transition between clear and distorted tone rather than “one step” motion.

Implementation Phase

There are two phases of the project. In phase 1, I would like to make a high gain distortion foot treadle pedal which can manage the gain level easily. By doing this, I make use of an existing overdrive schematic called “Brown Sound in A Box version 2” which gets from General Guitar Gadgets (http://www.generalguitargadgets.com/), see picture) to achieve my goals. In phase 2, I would like to enhance the functions of the effects unit (see table above). To control this, I make use of two DPOT bypass switches, one 3*3 DPOT bypass switch and one 4*1 DPOT bypass switch. Here is the Product Manual of the effects unit which shows all combinations of function:

<table>
<thead>
<tr>
<th>DPOT Bypass</th>
<th>DPOT Bypass</th>
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<tbody>
<tr>
<td>OFF</td>
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<td>ON</td>
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OFF: Clear sound for guitar, volume adjustable
ON: Distortion sound for guitar, gain adjustable

RESULTS

CONCLUSION

I am glad that I can complete this project by myself. Actually, it is really difficult to make a high gain distortion sound such that many professionals also fail to do that. In conclusion, this is a great experience for me to get more familiar with the guitar effects. To be true, I never thought my final year project can be something that I really get interesting. From now on, I will try to make more and more guitar effects unit in order to suit my needs.