

## Dual tones add-on card for TGSL metal detector

### **Abstract :**

This article presents an add-on card for the TGSL metal detector.  
It can be found onto the Geotech website : [www.geotech1.com](http://www.geotech1.com)

The original TGSL metal detector has a mono-tone audio stage.  
This card add a second tone to the detector.  
A low tone for ferrous and an high tone for non-ferrous items.

The original schematic use an half of a LM358 as a battery tester.  
This section will be re-build as a signal comparator and become a new ALL\_METAL channel.

The original operation is kept. The owner shall choose between « Normal » mode together with AM (all metal)/Disc(Discrimination) selection and « 2 Tones » mode.

Functionnality cost : As mentionned before, the original battery tester will be lost.

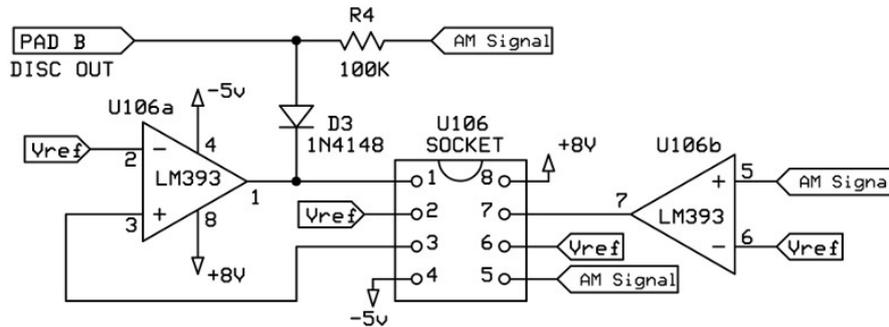
Note : This document applies only to TGSL and Add-on PCBs sold by Silverdog.  
Website : [www.silverdog.co.uk](http://www.silverdog.co.uk)

Thank you to all the contributors and specially to Ivconic, Eduardo and Silverdog.



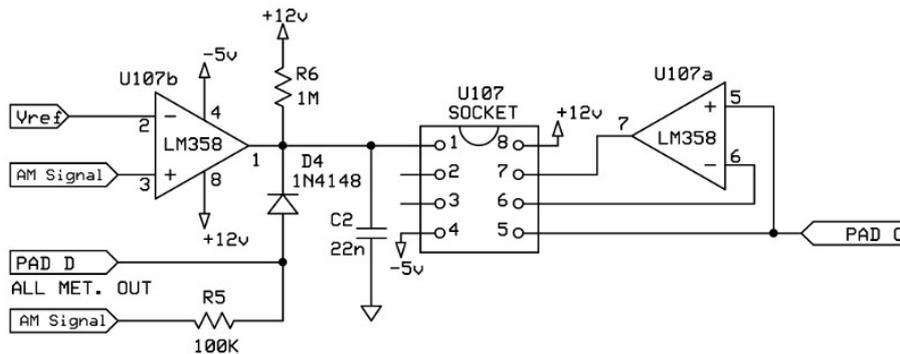
**Part 2 : Add-on card**

**LM393 :**



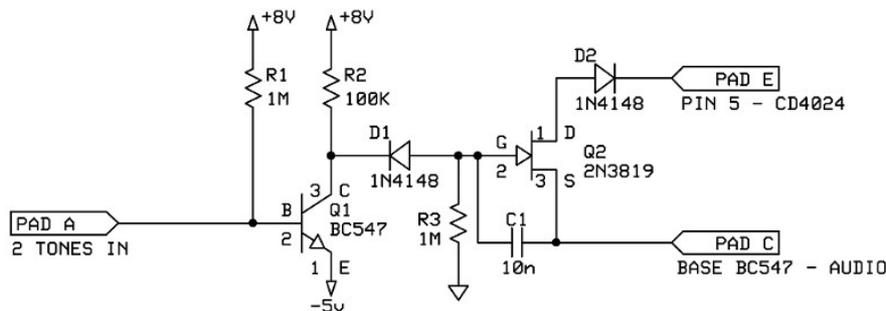
This part from the original design stays unchanged. The output signal of the LM393 (DISC OUT) will be used to drive the 2 tones section.

**LM358 :**



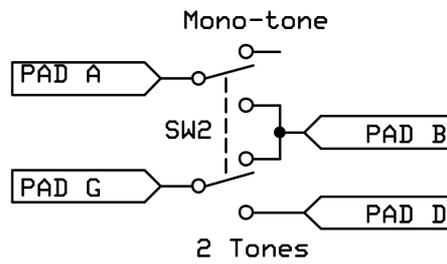
The half LM358 (U107b) originally used as a battery tester is now working like a comparator. It's a new ALL METAL channel. It will drive the audio section (U107a) in place of the LM393.

**2 tones :**



This new section will drive the FET transistor in order to change the audio tone (higher pitch) when a non-metal target will be detected.

**Mode switch :**



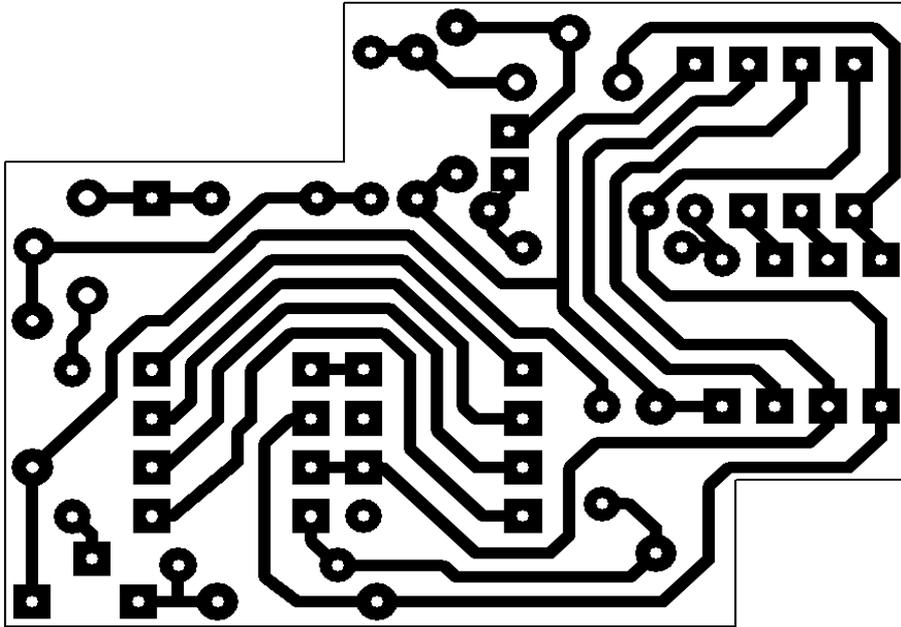
This switch allow to change from « normal » operation to « 2 tones » operation. It works together with the Disc switch.

	Disc/AM. SW	Mono/2 Tones SW	Audio
<b>Ferrous</b>	AM	Mono	High
Ferrous	AM	2 Tones	High
<b>Ferrous</b>	DISC	Mono	None
<b>Ferrous</b>	DISC	2 Tones	<b>Low</b>
<b>Non-Ferrous</b>	AM	Mono	High
Non-Ferrous	AM	2 Tones	High
<b>Non-Ferrous</b>	DISC	Mono	High
<b>Non-Ferrous</b>	DISC	2 Tones	<b>High</b>

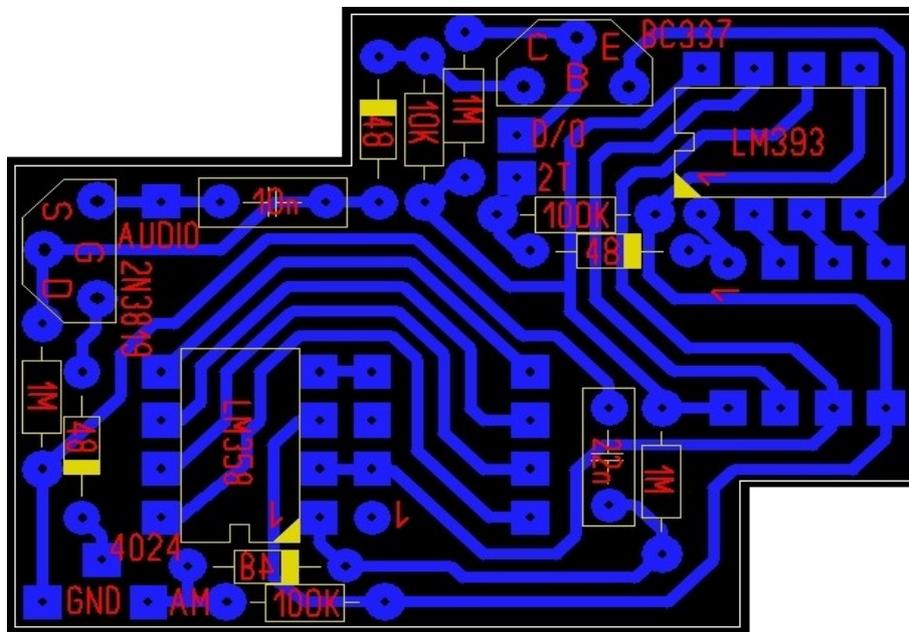
<span style="display:inline-block; width:20px; height:10px; background-color:blue;"></span>	Original All Metal Mode
<span style="display:inline-block; width:20px; height:10px; background-color:orange;"></span>	Original Discrimination Mode
<span style="display:inline-block; width:20px; height:10px; background-color:red;"></span>	2 Tones Discrimination Mode

**Circuit Board :**

**PCB :**



**Implementation :**



**Bill of material :****Resistors :**

- 10K Qty : 1
- 100K Qty : 2
- 1M Qty : 3

**Capacitors :**

- 10n Qty : 1
- 22n Qty : 1

**Diodes :**

- 1N4148 Qty : 4

**Transistors :**

- BC337 Qty : 1
- 2N3819 Qty : 1

**I.C. :**

- LM393 Qty : 1
- LM358 Qty : 1

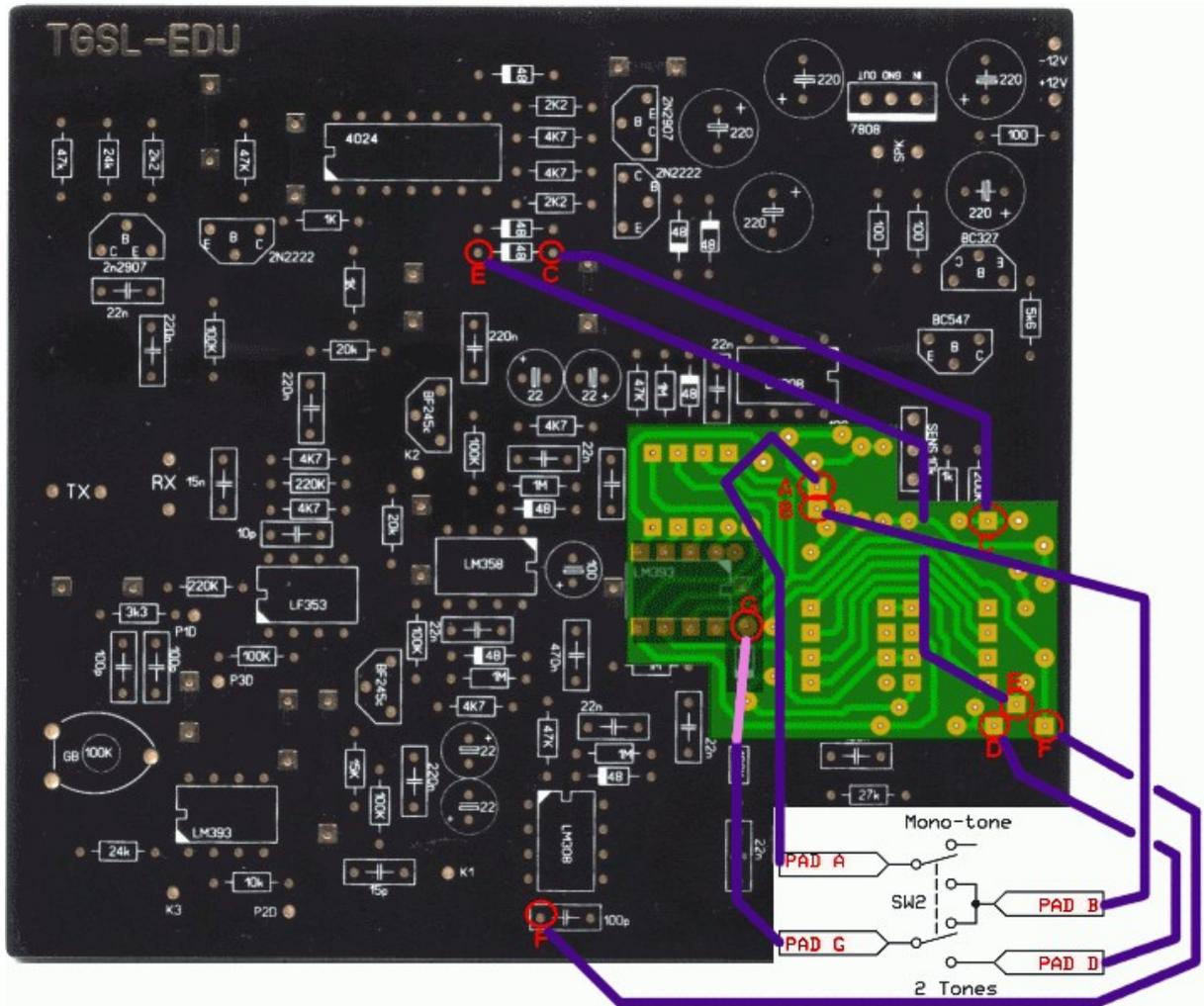
**Miscellaneous :**

- 8 pin DIL IC socket Qty : 2
- 4 way turned PCB header Qty : 4



- DPDT Switch Qty : 1

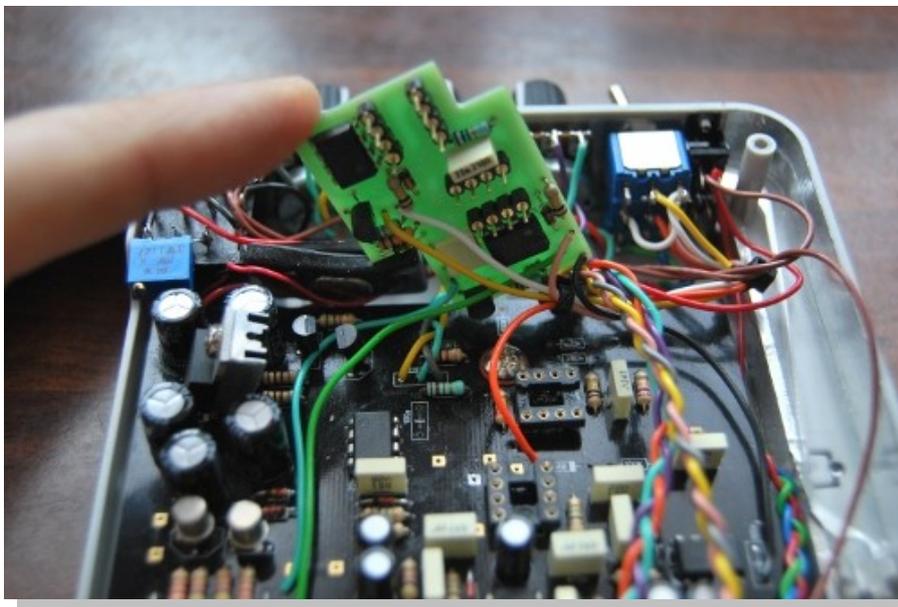
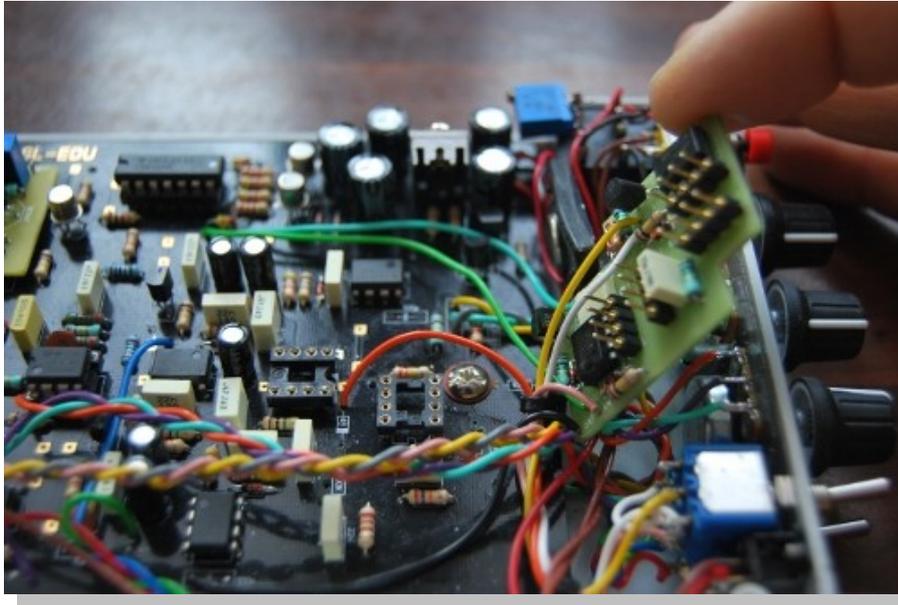
**Wiring diagram:**



Connect the switch as shown in this picture.

Note : The G pad is located on the main board under the add-on card.  
On the next version V3, this pad will be on the add-on card just like the others.

**Pictures :**



Good luck,

Hugo