

# *AudioStorm*



## *Sean Mandrake*

The Access DNA is the ultimate tweakers pedal. Internally it contains a no-compromise overdrive circuit with high bandwidth FET input buffer, Millennium bypass circuitry and a low impedance output driver to match any amp or drive long cables without noise or interference.

But. The really cool part is that the actual clipping circuit that is the heart of your sound is exposed, brought out to easy twist'n'go posts and left blank for you to design and create your own tone!

A selection of components and a comprehensive guide are included to get you started but once you have gotten the idea you can use any parts you find lying around, tear out of an old amp or buy from an electronics shop.

# Access DNA

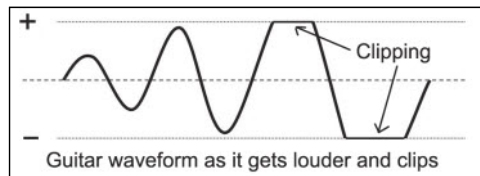
## Controls and sockets

<b>In</b>	This is the input from your guitar or preceding effects.
<b>Out</b>	The output when using a single amplifier.
<b>DC 9v</b>	Centre negative (Boss(TM) style) 2.1 mm power, 9-15vDC.
<b>Gain</b>	This controls the level that will drive your clipping circuit.
<b>Level</b>	This controls the overall output volume.
<b>Black twist</b>	Earth connection
<b>Red Twist</b>	The send output from the drive control
<b>Yellow twist</b>	The return back into the unit.
<b>Green twist</b>	Spare connection, for complex circuits.

## Designing your sound

There are two elements to an overdrive sound:

1. The clipping circuit is the part that does the 'distorting'. It uses two or more diodes. When you connect them across a circuit (like shorting the tip and ring parts on your guitar lead jack) they allow a certain amount of signal through, but if it gets too high, they start to do their job (conduct) and prevent the signal get any higher.



You need at least two because they only work in one direction but your guitar signal is a 'wave' and that swings both ways.

## Filtering

A combination of Resistors and Capacitors are used to create a filter circuit (also known as an RC circuit) that controls how much bass or treble are passed through to the output. By blocking bass you effectively make a sound brighter and by blocking treble you make it warmer!

## Identifying Components

**Capacitors** are marked in nF or uF. One uF = 1000 x 1 nF. Sometimes this is abbreviated to only numbers such as 472 or 103. This means 47 and two zeroes (4,700) or 10 and three zeroes (10,000). When only numbers are used the values are in pF. 1nF = 1000 x 1 pF. So 103 actually also means 10nF!

Don't worry you will get used to it quicker than you think!

**Resistors** use colour bands, which are translated into numbers. See the chart >>>

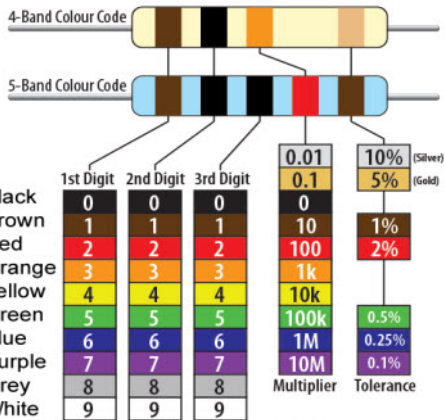
**Diodes** come in many, many varieties. **1N4148** are small-signal diodes and are the most common in overdrives.



**1N4001** are most often used in power supplies.

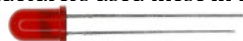


**1N60** is a Germanium diode, these clip sooner but softer and were invented before Silicon. They are much rarer, more delicate and more expensive than Silicon.



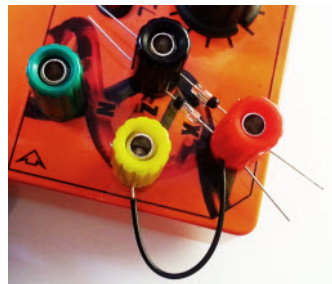
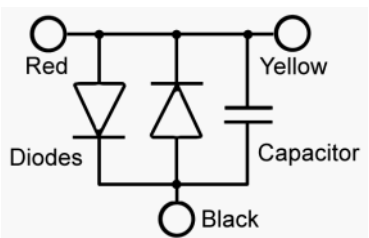
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**LED's** are also a type of diode! Many amp manufacturers used these in their valvestate and tube-simulator type amplifiers.



**Supplied starter parts :** You get a starter selection of various resistors (10k - 100k) and capacitors (10n to 47n) plus two each of all diodes.

**Designing your first Distortion :** Most of the well-known overdrives (Ibanez, DOD, Rat) are just a pair of diodes and maybe a capacitor.



Use the 1N4148 diodes and leave the capacitor out to begin with. Make sure that the diodes are 'back-to-back' or that the stripe on each is at a different end. Note the wire used to link the Red and Yellow posts, it won't work if left out.

### Capacitor

Now add in the capacitor. Start with the 10n which is what the DOD 250 uses. You might find it easier to connect it between the Yellow and Black posts. It will make the sound very, very slightly warmer. Try other values.

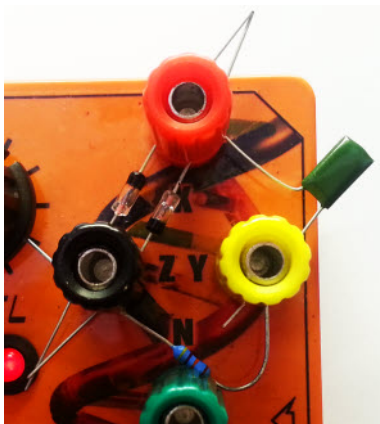
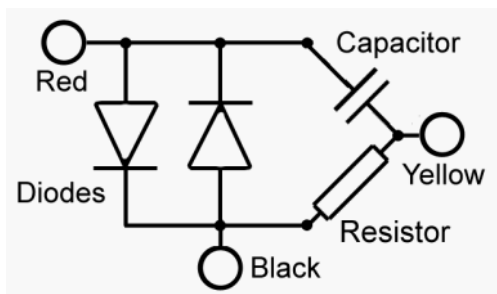
### Safety first

The voltages used are so low that you *cannot* hurt yourself, but if you get something wrong the result might be much louder than you expect!!

## Filtering

Tone filtering occurs whenever you use a Resistor and Capacitor together. The formula to find the 'cut-off' frequency is  $F = 1 / (2 \times \pi \times R \times C)$ . Since the ADNA has a 10k (internal) output, when combined with a 10n capacitor we get:  
 $1 / (2 \times 3.14 \times 10000 \times 0.00000001) = 16 \text{ KHz}$ . [22n = 7.2 KHz, 47n = 3.4 KHz].

When a resistor comes first like this it is a 'low pass' filter. Because low frequencies pass freely and high are restricted. We can create a high pass filter by setting things up in reverse and make a brighter sound instead of a warmer one.



Using a high value resistor and low value capacitor will create a thin sound. Try 47k and 10n for a really 1950's record sound.

## Asymmetric clipping

This happens when the top and bottom sides of a guitar waveform clip differently. It creates pleasant, smooth harmonics that sound good to the ear. To do this all you have to do is use two different diode types!

## More ideas

We hope to offer more ideas on our web site. If you have a great design you want to share, just email it to us and if we like it too, we will feature it on our web site.

## Terms, conditions and warranty

All AudioStorm pedals are designed and hand built by SeanMandrake. As such, every pedal will vary slightly and cosmetic imperfections are to be expected and are considered normal. Sometimes suppliers or manufacturers of parts change their prices or stock different components. Although AudioStorm will do everything in their power to keep a product the same sometimes we are forced to make changes and thus we reserve the right to substitute different parts or make changes as needed.

Every pedal is built from high quality, carefully selected components. If anything goes wrong or your pedal malfunctions AudioStorm will repair or replace it (at our discretion) for at least twelve months from the purchase date.

This guarantee excludes damage caused from unreasonable abuse. This includes but is not limited to: liquid damage of any sort, high impact physical damage, cosmetic damage, failure to follow instructions in this manual, and damage from using an incorrectly specified PSU. This guarantee also assumes that any equipment this unit is connected to is in good condition and thoroughly serviced. We take no responsibility for damage to equipment this unit is connected to, especially when exacerbated by neglect or failure to properly and thoroughly maintain equipment.

<http://www.seanmandrake.com>