

## HardWay RangeMaster Gen. VI

### 3-position Boost Frequency Control

#### Approximate Frequency Cutoff

The formula for cutoff frequency is  $f = 1 / (2 \times \pi \times R \times C)$

**Telecaster pickup** 7800  $\Omega$   
(A humbucker is about twice that, so the freq. would be half)

Capacitance			Freq.	
Middle	<b>Stock</b>	0.00005 Farads	<b>408</b>	Hz
Position 1	<b>Wide</b>	0.00015 Farads	<b>136</b>	Hz
Position 3	<b>Full</b>	0.00053 Farads	<b>38</b>	Hz
Alternate Stock*		0.000068	300	Hz

Pos 1 is 0.01 & Stock in parallel  
Pos 3 is 0.047 & Stock in parallel

\* Original Rangemasters sometimes had this value

String	Frequency	Scientific pitch notation
1 (E)	329.63 Hz	E4
2 (B)	246.94 Hz	B3
3 (G)	196.00 Hz	G3
4 (D)	146.83 Hz	D3
5 (A)	110.00 Hz	A2
6 (E)	82.41 Hz	E2

Highest note on guitar (24 frets) 1318.51 Hz

The **RangeMaster** is a treble booster.

In its stock configuration, the .005 $\mu$ F input capacitor set the cutoff at ~408 Hz. Everything above this frequency was boosted.

On the guitar, that means anything higher than the G# on the high E string (G# 4) is boosted.

That's anything from the fourth fret on the high E string on up. (And of course, any equivalent frequencies played on other strings.)

The Gen. VI modification to the input capacitor widens the range of the boost to include more of the lower guitar frequencies.

The chart to the left shows the cutoff change by adding a capacitance in parallel to the stock tone cap. The auxilliary cap can be switched.

The most common "Full Range" capacitor is .01  $\mu$ F in parallel with the stock .005, which changes the cutoff to 136 Hz. A big change, very noticable.

A true "Full Range" though, would be a .047  $\mu$ F in parallel, which changes the cutoff to 38 Hz, and includes all the open strings of a guitar.

The modification here uses a 3-way switch for the three settings described.