The Two Dollar Regen

by Tony - G4WIF

This radio would never have been born but for the enthusiasm of Doug Hendricks KI6DS. Doug decided that it would be a good wheeze if there were a construction contest at Hamcom 1999. There followed a blaze of e-mails from Doug to QRP-l, and like a later day P.T. Barnum, he hustled a lot of people (including me) into building. I will confess straight off that I have plagiarized shamelessly from articles of others, mostly from the late Doug DeMaw[1] W1FB. Doug's regen circuit used a variable capacitor. I decided that the difference with my radio, was that it would be really cheap to build, so I adapted it for varicap tuning.

Ten turn pots are expensive, so I pinched an idea from Graham G3MFJ and soldered some shafts onto a couple of miniature preset (multi-turn) potentiometers. This made tuning and regeneration control very smooth.

J-Fet Q1 does all the hard work and the 741 op-amp delivers enough audio to power a pair of walkman phones. There was plenty of gain when connected to my doublet, but on a yard or so of wire, it needed some help from a 2N2222 RF stage (this time stolen from the NA5N Desert Ratt).

The inductor L2 is formed by placing 46 turns of 28 SWG enameled copper wire on a T50-6 toroid. At 11 turns from the grounded end, take a tap which will go to the regeneration control. L1 is 5 turns of 28 SWG wires wound on top of the grounded end of L2. The nearest AWG gauge is 27, so I suggest using the next smallest available wire. The BB204 is a "double" varicap, and I grounded the two anodes so as to place both vaicaps in parallel.

With the components chosen, the regen covers the 49 metre shortwave band. Alter the turns on L2 and the values of C8 and C10 for other bands.

The method of construction I use is similar to the "Manhattan" style - made popular by my good friend Jim Kortge K8IQY. I prefer to avoid contact with superglue as it always does a better job of sticking me. So I make my pads by using a modified wood drill that cuts a circular "island" in the PCB material. Layout isn't too critical, but I advise not letting L1/L2 "see" the audio stage. In Fig 1, you can see I placed an off cut of PCB material in-between the stages. If some components appear to be missing in Fig. 1, it will because I located them underneath the board.

As an extra refinement (and therefore not included in the "Two Dollar" rough cost), I adapted the G3RJV voltage monitor[2] to indicate approximate frequency. The idea to use the LM3914 in this way came from Bill Jones, KD7S[3]. This circuit uses an LM3914 Dot/Bar display driver which measures the voltage at the slider of the tuning potentiometer. The higher the voltage, the more reversed biased the varicap becomes, and therefore the higher the tuned frequency. Transistor Q3 is in common collector mode and therefore presents a high impedance to the varicap tuning circuit so as not to load it unduly.

Component List
The "Two Dollar Regen" .

COMPONENT REFERENCE	VALUE	QTY	TYPE	COMPONENT REFERENCE	VALUE	QTY
C1	100pF	1	Silver Mica	R1	100K	1
C2 C3 C5	0.01uF	3	Disc	R2	330Ω	1
C4	47uF	1	Electrolytic	R3 R6	1K Ω	2
C6	100uF	1	Electrolytic	R4 R9 R10	100Ω	3
C7	4.7uF	1	Electrolytic	R5 R7 R8	47KΩ	3
C8	30pF	1	Silver Mica	R11	820KΩ	3
C9	22pF	1	Silver Mica	R12	15KΩ	1
C10	20pF	1	Silver Mica	R13	470KΩ	1
C11	4.7uF	1	Electrolytic	R14	2.2KΩ	1
D1	BB204	1	Varicap Diode	R15	4.7KΩ	1
L1/L2 (see text)	T50-6			R16	1.2KΩ	1
L3	22uH	1	Inductor	R17	1.5KΩ	1
Q1	2N3819	1	N Chan. J Fet	R18	56KΩ	1
Q2 & Q3	2N2222	2	NPN transistor	R19	22KΩ	1
U1	741	1	Op Amp			
VR1	1KΩ	1	Preset			
VR2	22KΩ	1	Preset			
VR3 & VR4	4.7KΩ	2	Preset			

References:

[1] W1FB's Design Notebook pages 60 & 109.

[2] SPRAT 96 page 9.

[3] QRPp Spring 1997. Page 33

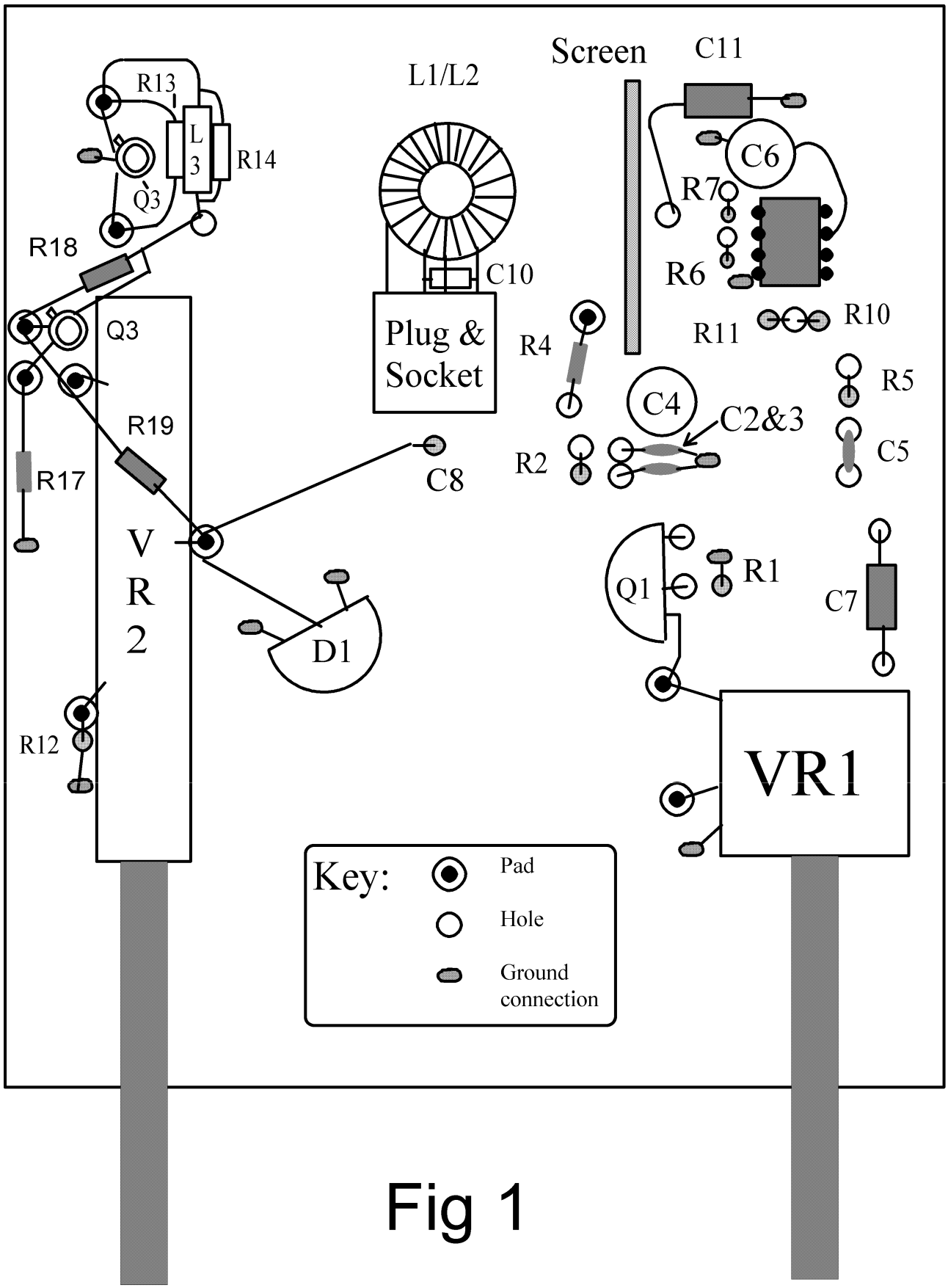
R13
L3
R14
Q3
R18
Q3
R19
R17
VR2
R12
D1
C8
L1/L2
C10
Plug & Socket
Screen
C11
C6
R7
R6
R4
R11
R10
R5
C4
C2&3
C5
R2
Q1
R1
C7
VR1
Key:
Pad
Hole
Ground connection

Fig 1

References:

[1] W1FB's Design Notebook pages 60 & 109.
[2] SPRAT 96 page 9

References:

[1] W1FB's Design Notebook pages 60 & 109.
[2] SPRAT 96 page 9

Circuits:

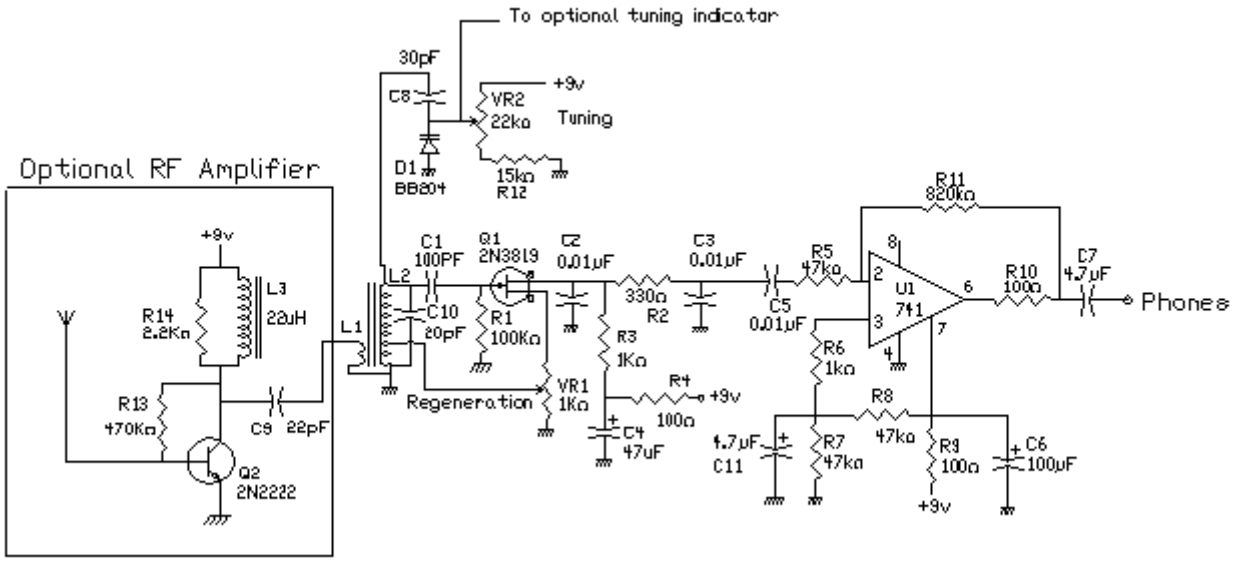

Figure 2 - The receiver.

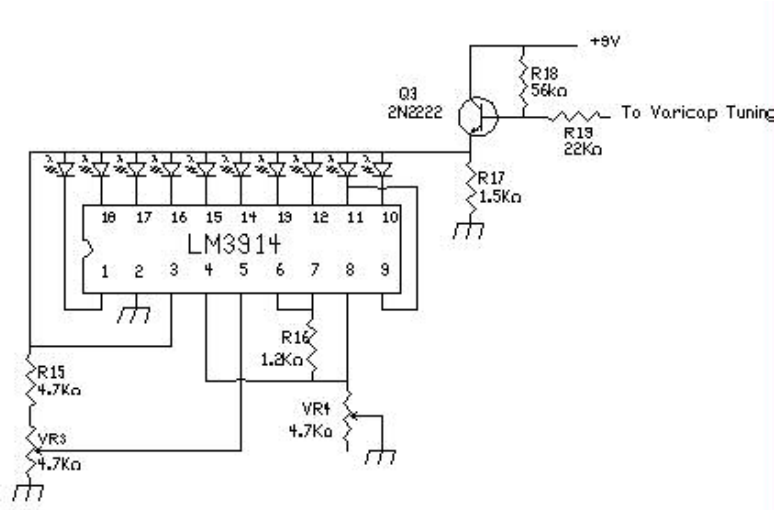

Figure 3 - Optional Tuning Indicator.