

Notes to the builder

Check Before you Solder!

It is important to get the electronic components in the right places for the circuit work properly and changing them after you have soldered them can be difficult. So, check and double check that you have the right part in the right place before you solder it in place.

Once each part is soldered in place, tick off the check box so you do not forget where you are up to.

All components

Each component is given a grid reference in red (e.g.) (F2) Use this reference with the silk screen map included in these instructions to correctly locate the component placement, double check component alignment.

Capacitors

Pay close attention when fitting the capacitors. Electrolytic capacitors (larger cylindrical bodies) need to be installed the correct way around. Each Electrolytic capacitor has a white stripe down one side. This is the negative and needs to be aligned with the (-) on the circuit board. The positive lead is a little longer too.

Headphone Socket

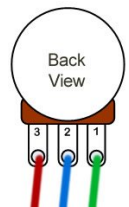
Installing the headphone socket may require some tape to hold the component in place while soldering. Use the tape to hold the socket while you make the 1st solder connection.

Potentiometers

Wire each potentiometer in the same way as shown in the diagram. LIN pots are marked with a "B" and Log pots are marked with an "A"

Variable Capacitor

Attach the varicap with pins pointing down. Solder the centre pin to the front panel and solder the black wire the same location. use the pin closest to the Volume control- Solder the white cable to this point.



Front Panel

Remove some of the lacquer below the Varicap to a solder joint to be created between the panel and the variable capacitor. Apply some solder to the panel, then the wire, then finally the Varicap.



Antenna socket











Solder both the top & bottom of the Antenna Socket to achieve greater mechanical stability.

Molex









Install all connectors with the pins facing outwards. Use some tape to hold the connector in place while you make the first solder joint.

Part 1. Hardware Construction



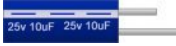






Front Panel

Component	Task	Complete
	TUNE Fit Varicap to panel & Install knob	<input type="checkbox"/>
	VOL Fit 10k LOG (A) Pot to panel & Install knob	<input type="checkbox"/>
	REGEN Fit 10k LIN (B) Pot to panel & Install knob	<input type="checkbox"/>
	FINE TUNE Fit 100k LIN (B) Pot to panel & Install knob	<input type="checkbox"/>
	ATTEN Fit 10k LOG (A) Pot to panel & Install knob	<input type="checkbox"/>
	Cut Red, Blue & Green wire to approx. 6cms and solder to VOL pot (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	Cut black & white wire to approx. 6cms and solder to Varicap (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	Cut Red, Blue & Green wire to approx. 8cms and solder to FINE pot (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	Cut Red, Blue & Green wire to approx. 10cms and solder to REGEN pot (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	Cut Red, Blue & Green wire to approx. 6cms and solder to ATTEN pot (<i>See Notes to the builder</i>)	<input type="checkbox"/>

PCB

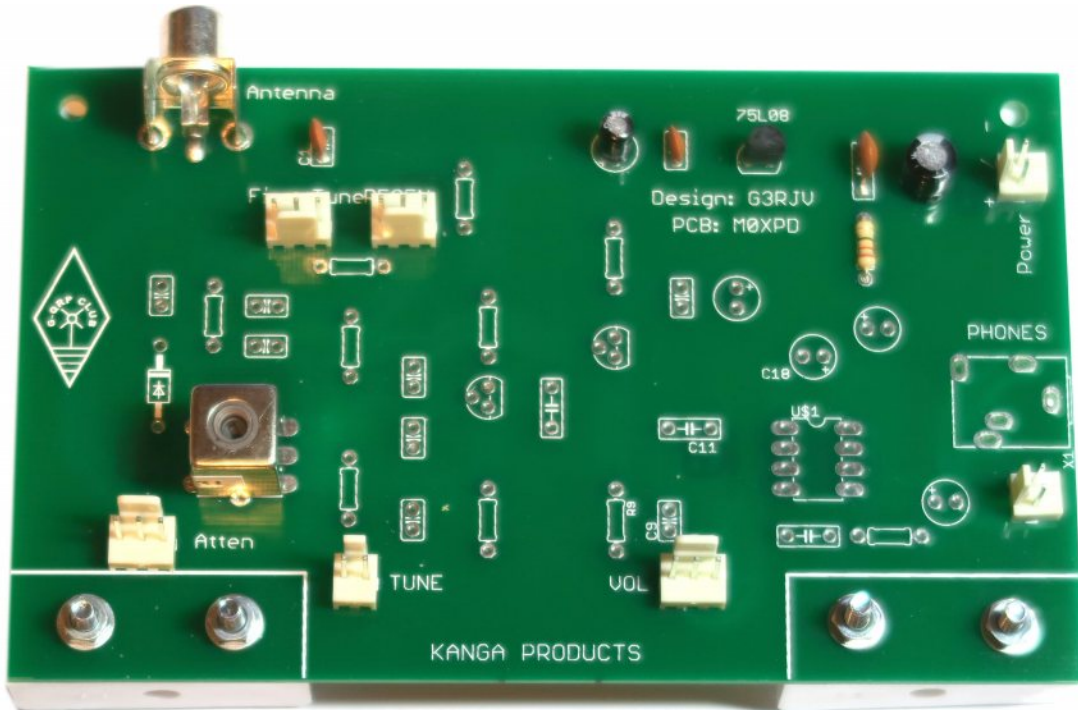
	(C5) Tune Connection (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(I1) Power connection (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(I4) Speaker connection (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(A4) Attenuation (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(B1) Fine Tune (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(C1) REGEN (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(F5) Volume connection (<i>See Notes to the builder</i>)	<input type="checkbox"/>
	(A5) & (H5) Install with the flat surface facing forward to allow the attachment of the front panel. Don't attach panel yet	<input type="checkbox"/>

Part 2. Power Supply Construction

Component	Task	Complete
	(H2) Fit 22Ω (Coloured Red, Red, Black, Gold). Solder in place	<input type="checkbox"/>
	(G1) Fit 7808 Voltage regulator. Centre pin bent back. Check Orientation. Solder in place	<input type="checkbox"/>
	(E1) Fit Capacitor. Marked 10uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(H1) Fit Capacitor. Marked 100uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(H1) Fit 100nF Capacitor. Marked 104. Solder in place.	<input type="checkbox"/>
	(F1) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>
	(B1) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>
	(A0) Antenna Socket (See Notes to the builder)	<input type="checkbox"/>
	(B4) Coil	<input type="checkbox"/>

Part 2. Power Supply Testing

Your circuit should now look like this.


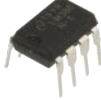









Complete the following tests before moving onto the next stage.

	Test	Complete
1	Check over your soldering. Make sure all wires are trimmed, and no short circuits are present.	<input type="checkbox"/>
2	Connect a 9v battery to the battery snap and connect the battery lead to the POWER Molex connector on the PCB	<input type="checkbox"/>
3	Measure between pins 6 and pin 4 of IC (G4) that you have 9 Volts	<input type="checkbox"/>
4	Measure across C1. (B1) Ensure you have 8 Volts	<input type="checkbox"/>
5	Disconnect the battery.	<input type="checkbox"/>

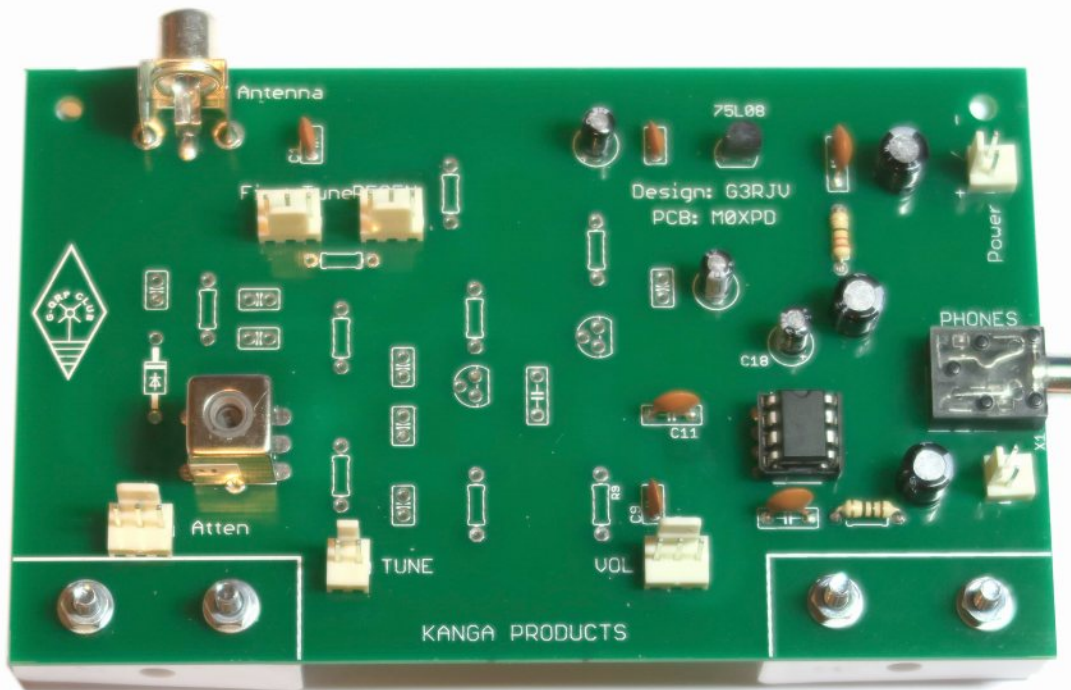
Move onto Part 3

Part 3. The Audio Amplifier Construction

Component	Task	Complete
	(G4) Fit 8 pin IC Socket Check Orientation.	<input type="checkbox"/>
	(G4) LM386 - Check Orientation. you may need to squeeze the pins in gently so they fit the socket	<input type="checkbox"/>
	(H4) Fit 10Ω Resistor (Coloured brown, black, black, Gold). Solder in place	<input type="checkbox"/>
	(G3) Fit Capacitor. Marked 10uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(H4) Fit Capacitor. Marked 100uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(F2) Fit Capacitor. Marked 10uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(H2) Fit Capacitor. Marked 100uF. Solder in place (See Notes to the builder) Check Orientation	<input type="checkbox"/>
	(F3) Fit 100nF Capacitor. Marked 104. Solder in place.	<input type="checkbox"/>
	(G4) Fit 100nF Capacitor. Marked 104. Solder in place.	<input type="checkbox"/>
	(F4) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>
	(I3) Headphone Socket	<input type="checkbox"/>

Part 3. The Audio Amplifier Testing

Your circuit should now look like this.



Complete the following tests before moving onto the next stage.

	Test	Complete
1	Check over your soldering. Make sure all wires are trimmed, and no short circuits are present.	<input type="checkbox"/>
2	Connect a 9v battery to the battery snap and connect the battery lead to the POWER Molex connector on the PCB	<input type="checkbox"/>
3	Connect either headphones or a speaker to the PCB	<input type="checkbox"/>
4	With a screwdriver touch the middle pin of the Molex connector marked "VOL" (F5) Ensure you can hear a buzz	<input type="checkbox"/>
5	Connect VOL connector from front panel and again touch middle pin.	<input type="checkbox"/>
6	Ensure the volume control makes buzz louder & quieter	<input type="checkbox"/>
7	Disconnect battery.	<input type="checkbox"/>





Move onto Part 4

Part 4. The Demodulator & Oscillator

Construction

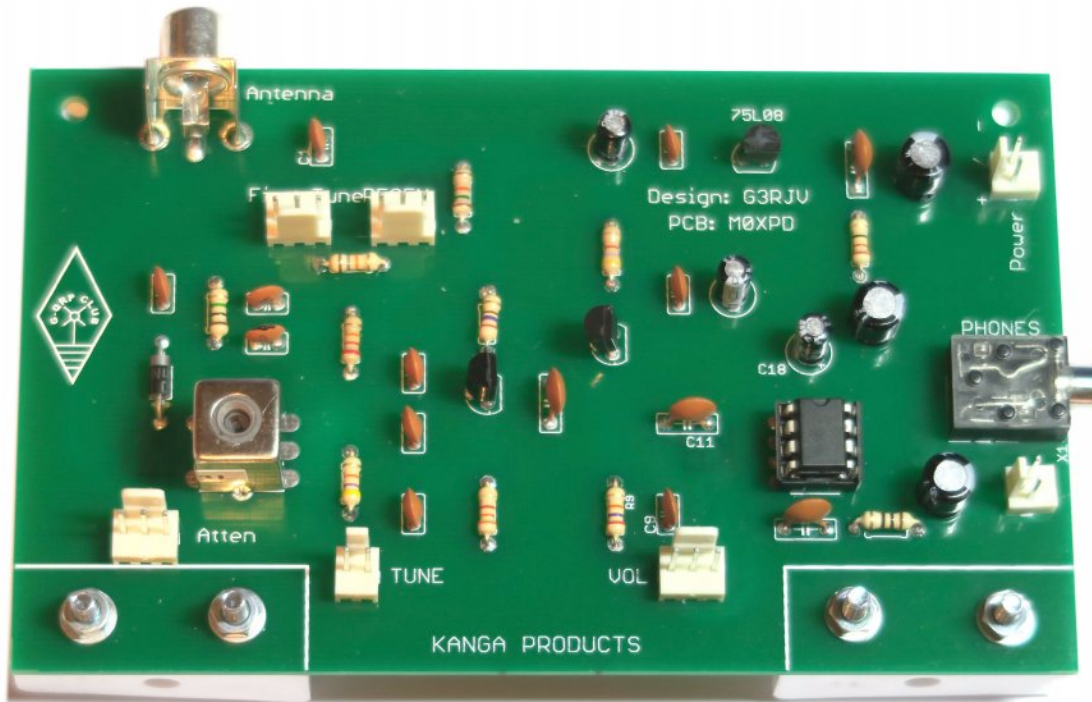
Component	Task	Complete
	(D1) Fit 15K Ω (Coloured Brown, Green, Orange, Gold). Solder in place	<input type="checkbox"/>
	(D4) Fit 3.3K Ω (Coloured Orange, Orange, Red, Gold). Solder in place	<input type="checkbox"/>
	(C4) Fit 47K Ω Resistor (Coloured Yellow, Violet, Orange, Gold). Solder in place	<input type="checkbox"/>
	(A2) Fit 1M Ω (Coloured Brown, Black, Green, Gold). Solder in place	<input type="checkbox"/>
	(C2) Fit 10K Ω (Coloured Brown, Black, Orange, Gold). Solder in place	<input type="checkbox"/>
	(C3) Fit 22k Ω (Coloured Red, Red, Orange, Gold). Solder in place	<input type="checkbox"/>
	(D2) Fit 270 Ω (Coloured Red, Violet, Brown, Gold). Solder in place	<input type="checkbox"/>
	(A3) Fit IN4001 Check Orientation . Solder in place	<input type="checkbox"/>
	(D3) Fit 2N3904 Centre pin bent back. Check Orientation . Solder in place	<input type="checkbox"/>
	(B3) Fit 10pF Capacitor. Marked 10 or 10p. Solder in place.	<input type="checkbox"/>
	(B2) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>
	(A2) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>
	(C3) Fit 33pF Capacitor Marked 33. Solder in place.	<input type="checkbox"/>
	(C3) Fit 330pF Capacitor. Marked 331. Solder in place.	<input type="checkbox"/>
	(C4) Fit 330pF Capacitor. Marked 331. Solder in place.	<input type="checkbox"/>
	(E3) Fit 100nF Capacitor. Marked 104. Solder in place.	<input type="checkbox"/>

The Demodulator

	(E3) Fit 2N3819 Centre pin bent back. Check Orientation . Solder in place	<input type="checkbox"/>
	(E2) Fit 4.7K Ω (Coloured Yellow, Violet, Red, Gold). Solder in place	<input type="checkbox"/>
	(E4) Fit 27K Ω (Coloured Red, Violet, Orange, Gold). Solder in place	<input type="checkbox"/>
	(F4) Fit 10nF Capacitor. Marked 103. Solder in place.	<input type="checkbox"/>

Part 4. The Demodulator & Oscillator Testing

Your circuit should now look like this.



There are no further tests, just follow the next instructions and you are ready to test the completed radio

	Task	Complete
1	Connect Front panel and screw in place using the modesty blocks, Nuts, washers and bolts	<input type="checkbox"/>
2	Connect all the potentiometer cables to the circuit board and double check you have the right lead going to the right Molex plug/socket	<input type="checkbox"/>
3	Connect either a speaker or headphones	<input type="checkbox"/>
4	Connect a wire antenna (60cms of wire will work)	<input type="checkbox"/>
5	Connect a 9v battery to the battery snap and connect the battery lead to the POWER Molex connector on the PCB	<input type="checkbox"/>
6	Use the TUNE / FINE to adjust the frequency of the radio. and adjust the REGEN control to bring the set into oscillation when listening to SSB/CW.	<input type="checkbox"/>
7	Set the TUNE control to half way, using a receiver set to 7Mhz adjust the coil until you can hear the oscillator running on the receiver	<input type="checkbox"/>

Acknowledgements and Further Information

About this kit

This kit was designed by George Dobbs, G3RJV. The PCB designed by Paul Darlington M0XPD. For a full description of the circuit, see Practical Wireless, April 2015.

This instruction booklet was prepared by Dan Trudgian, M0TGN.

Test builds using these instructions were carried out by Steve Hartley, Tony Fishpool & Dan Trudgian. A video of the test build construction can be viewed on YouTube here :
<https://www.youtube.com/watch?v=LZuM3KOGkkg>

Useful links

- GQRP club <http://www.ggrp.com/>
- Kanga Products <http://www.kanga-products.co.uk>

Buildathons

This kit is just one of many kits that the Bath Buildathon Crew have introduced to new radio amateurs, shortwave listeners and people with a general interest in electronics. The Bath Crew run a Buildathon in January of each year to help students on Intermediate training courses in Bath. However, the buildathons are also open to anyone who would like to build a fun radio project.

For further information on up and coming buildathons, projects and training for amateur radio both in class and via distance learning, please email Steve g0fuw@tiscali.co.uk

Parts List

Resistors

R1	270
R2	3k3
R3	22k
R4	47k
R5	1M
R6	15k
R7	10k
R8	4k7
R9	27k
R11	22
R12	10

Semiconductors

D1	1N4001
IC1	78L08
Q1	2N3904
Q2	2N3819
U\$1	LM386

Coil/Transformer

L1	SPECTRUM-10K 5u3-L
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Miscellaneous

3-way cabled Molex leads
2-way cabled Molex leads
Modesty Blocks
M3 25mm Pan Screws
M3 Nuts
M3 Washers
DIL8 Socket
Small knobs
Large knob
Polyvaricon Mounting Screws
Main PCB
Front Panel PCB
9v battery clip.

Capacitors

C1	10n
C2	10n
C3	10n
C4	10p
C5	33p
C6	330p
C7	330p
C8	100n
C9	10n
C10	10n
C11	100n
C12	100n
C13	10n
C14	100n
C15	10u
C16	100u
C17	100u
C18	10u
C19	100u
C20	10u

Controls

FINE TUNE	100k	LIN (B)
REGEN	10k	LIN (B)
ATTEN	10k	LOG (A)
VOLUME	10k	LOG (A)
TUNING	60 pF	Polyvaricon Cap

Connectors

JP1	1X03	pinhead
JP2	1X02	pinhead
JP3	1X03	pinhead
JP4	1X03	pinhead
JP5	1X03	pinhead
JP7	1X02	pinhead
JP8	1X02	pinhead
U\$3		Phono Socket
X1		3.5mm Stereo Skt