EGV-9B_BPFLPF

v2

BPF/LPF module for EGV-9B v2

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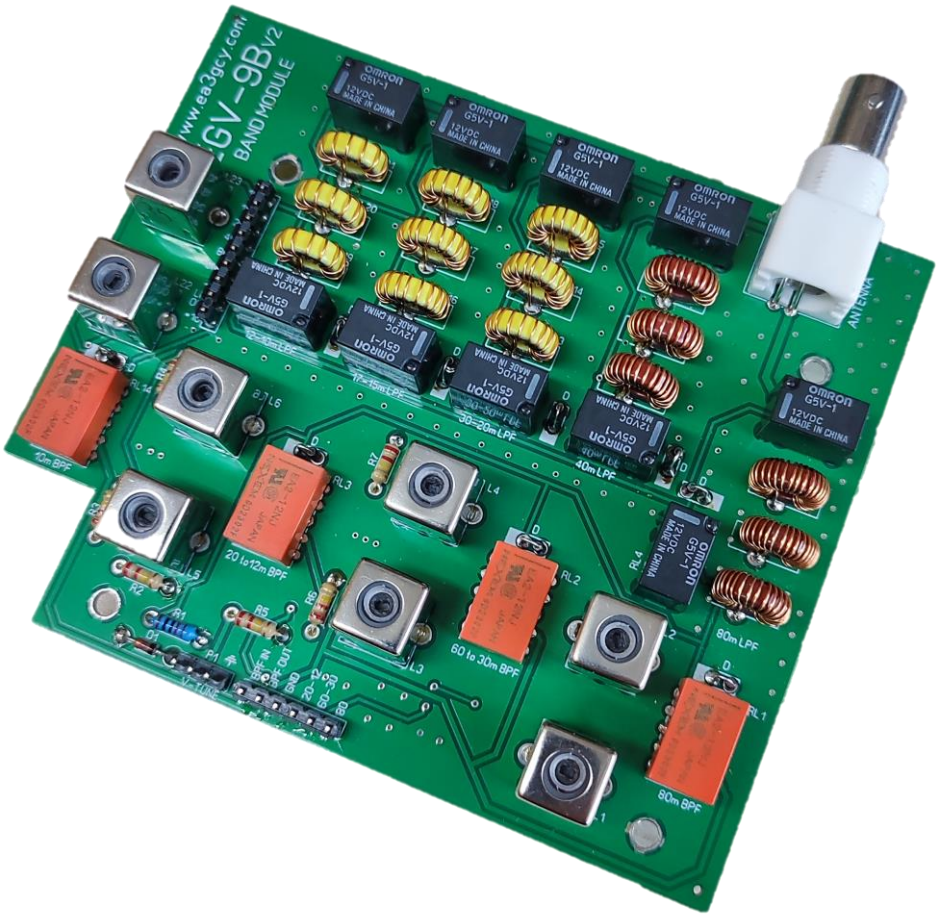


Thank you for building the ***EGV-9B_BPFLPF v2*** module

Have fun assembling it and enjoy QRP! 73 Javier Solans, ea3gcy

INTRODUCTION

EGV-9Bv2_BPFLPF

The EGV-9Bv2_BPFLPF is the 3 to 30MHz filter plug-in module for the EGV-9Bv2 9-band CW transceiver.

This module incorporates five 7-pole low-pass filters, two variable band-pass filters with varicap tuned and two fixed band-pass filter (80 and 10m). All the filters are switched by means of relays to avoid their interactions.

Note: good experience on radio assembly is required. It shouldn't be your first transceiver to build.

All SMD parts soldered at the factory. You don't have to solder anything SMD

SPECIFICATIONS

RX BAND-PASS FILTER:

Power requirements: 12 – 14VDC

Antenna impedance: 50 ohms nominal.

Frequency:

1) **Fixed filters for 80m and 10m**
2) **Variable filter from 60 to 30m**
3) **Variable filter from 20 to 12m**

LOW PASS FILTER:

Filters: 80m, 60-40m, 30-20m, 17-15m and 12-10m

Harmonics output: -45dBc or better below the fundamental frequency (excepted 60, and 17m)

Other spurious signals: -50dBc or better below the fundamental frequency.

60, and 17m bands: The attenuation of harmonics signals are not so good.

Switching: Relays.

Board dimensions: 100 x 115 mm.

PLEASE READ ALL ASSEMBLY INSTRUCTIONS COMPLETELY AT LEAST ONCE BEFORE YOU BEGIN.

COMPONENT LIST

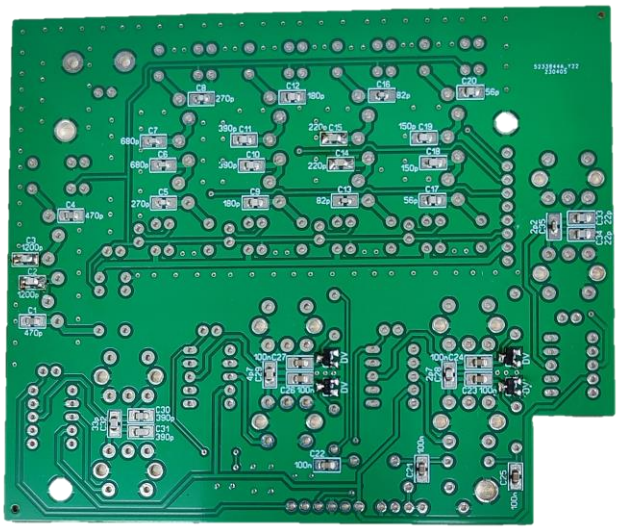
Resistors					
Checked		Ref.	Value	Ident./Comment	Located
		R1	220 Ω		Top layer
		R2	220K		Top layer
		R3	220K		Top layer
		R4	220K		Top layer
		R5	220K		Top layer
		R6	220K		Top layer
		R7	220K		Top layer
Potentiometer					
		P1	50K	50K shaft potentiometer 50K 503	Top layer

Capacitors					
Checked		Ref.	Value	Ident./Comment	Located
		C1	470p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C2	1200p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C3	1200p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C4	470p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C5	270p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C6	680p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C7	680p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C8	270p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C9	180p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C10	390p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C11	390p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C12	180p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C13	82p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C14	220p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C15	220p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C16	82p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C17	56p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C18	150p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C19	150p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C20	56p	SMD capacitor NP0 or CG0 100V	Bottom layer
		C21	100n	SMD capacitor 50V	Bottom layer
		C22	100n	SMD capacitor 50V	Bottom layer
		C23	100n	SMD capacitor 50V	Bottom layer
		C24	100n	SMD capacitor 50V	Bottom layer
		C25	100n	SMD capacitor 50V	Bottom layer
		C26	100n	SMD capacitor 50V	Bottom layer
		C27	100n	SMD capacitor 50V	Bottom layer
		C28	2p7	SMD capacitor 50V	Bottom layer
		C29	4p7	SMD capacitor 50V	Bottom layer
		C30	390p	SMD capctiro 50V	Bottom layer
		C31	390p	SMD capacitor 50V	Bottom layer
		C32	33p	SMD capacitor 50V	Bottom layer
		C33	22p	SMD capacitor 50V	Bottom layer
		C34	22p	SMD capacitor 50V	Bottom layer
		C34	2p2	SMD capacitor 50V	Bottom layer
Note: All SMD places allow 0603, 0805, 1206 or 1210 format					

Semiconductors					
Checked		**Ref.**	**Type**	**Ident./Comment**	**Located**
		Printed "D"	**9 x diodes printed D are 1N4148** (vertically mounted)		Top layer
		Printed "DV"	**All diodes printed DV are BB201 SMD** (bottom layer PCB)		Bottom layer
		D1	10V zener 0.5W	10V	Top layer

Inductors/RF Transformers/Relay					
Checked		**Ref.**	**Value/Type**	**Ident./Comment**	
		L1	5u3H 3334	34 Shielded coil	Top layer
		L2	5u3H 3334	34 Shielded coil	Top layer
		L3	5u3H 3334	34 Shielded coil	Top layer
		L4	5u3H 3334	34 Shielded coil	Top layer
		L5	1u2H 3335	35 Shielded coil	Top layer
		L6	1u2H 3335	35 Shielded coil	Top layer
		L22	1u2H 3335	35 Shielded coil	Top layer
		L23	1u2H 3335	35 Shielded coil	Top layer
Winding toroids (see text)					**Turns (0.4 wire)**
		L7	T37-2	Red toroid	25 turns
		L8	T37-2	Red toroid	27 turns
		L9	T37-2	Red toroid	25 turns
		L10	T37-2	Red toroid	18 turns
		L11	T37-2	Red toroid	20 turns
		L12	T37-2	Red toroid	18 turns
		L13	T37-6	Yellow toroid	15 turns
		L14	T37-6	Yellow toroid	16 turns
		L15	T37-6	Yellow toroid	15 turns
		L16	T37-6	Yellow toroid	12 turns
		L17	T37-6	Yellow toroid	14 turns
		L18	T37-6	Yellow toroid	12 turns
		L19	T37-6	Yellow toroid	10 turns
		L20	T37-6	Yellow toroid	11 turns
		L21	T37-6	Yellow toroid	10 turns
Relays					
		RL1,RL2, RL3, RL14	EA2-12NJ	EA2- 12NJ (NEC or KEMET)	--
		RL4 to RL13	G5V-1 12V	Omron G5V-1 12V	--

Hardware				
Checked		**Qty/Ref.**	**Type/Comment**	**Located**
		1 BNC socket	BNC socket	Top layer
		8 pins strip	8 pins extra long strip (LPF switching)	Top layer
		6 pins strip	6 pins extra long strip (BPF switching)	Top layer
		3 pins strip	3 pins strip "V-TUNE"	Top layer
		4 10mm spacers	4 pcs 10mm metal spacers	Top layer
		6 M3 nuts	6 pcs. M3 nuts	Top layer
		4 M3x10	4 pcs. M3 x 10mm screws	Bottom layer
		4 M3x4	4 pcs. M3 x 4 or 5mm screws	Top layer
		400 cm	400 cm enamelled wire 0,4mm	--

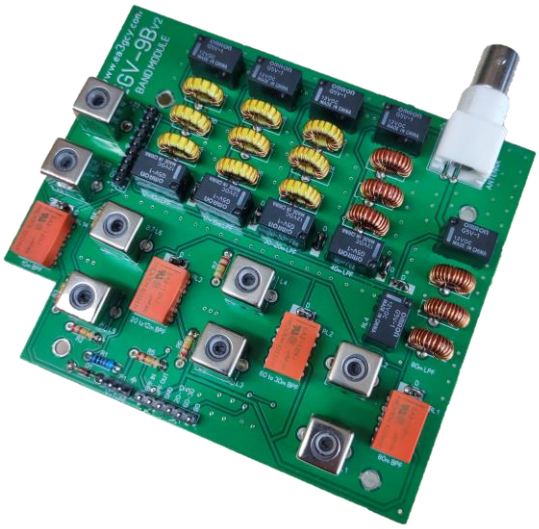


RECOMMENDED ASSEMBLY SEQUENCE

All SMD parts soldered at the factory. You don't have to solder anything SMD

Based on your experience you can place the components in the order you are used to.
However I can recommend the following assembly sequence:

- Place and solder D1 10V zener diode.
- Insert and solder all resistors
- Insert and solder the other nine diodes (1N4148) all printed “D” on PCB. They are all placed vertically (see the images).
- Insert and solder all shielded coils (make sure they lie flat on the board). L1 to L4 are 5u3H marked 34. L5, L6, L22 and L23 are 1u2H marked 35.
- Insert and solder toroids (see section “TOROIDS WINDNG”).
- Place and solder all relays. RL1, RL2 RL3 and RL14 have a printed line that has to match the one printed on the board (see the images).
- Place and solder BNC antenna socket.
- To finish, solder the pins strips. This is important work. See the section “wiring and connections”
- All capacitors are SMD format and are soldered in bottom PCB by www.ea3gcy.com lab.



TOROIDS WINDING

⇨The following table shows the type of toroid, the turns it has to wind and the length of wire it will need. All toroids are 9.5mm/0.375in outside diameter. The T37-2 toroid is the red one and the T37-6 is the yellow one. 0.4 mm thick enameled wire is used.

TOROIDS TABLE				
TOROID	**BAND**	**TYPE**	**TURNS**	**WIRE lenght** (0.4mm Ø)
L7	80	T37-2	25	36 cm
L8	80	T37-2	27	39 cm
L9	80	T37-2	25	36 cm
L10	60-40	T37-2	18	28 cm
L11	60-40	T37-2	20	30 cm
L12	60-40	T37-2	18	28 cm
L13	30-20	T37-6	15	24 cm
L14	30-20	T37-6	16	25 cm
L15	30-20	T37-6	15	24 cm
L16	17-15	T37-6	12	20 cm
L17	17-15	T37-6	14	23 cm
L18	17-15	T37-6	12	20 cm
L19	12-10	T37-6	10	18 cm
L20	12-10	T37-6	11	19 cm
L21	12-10	T37-6	10	18 cm

Note: Lengths are calculated so that you will have some wire left over and easy to pull on.

TOROIDS ASSEMBLY EXAMPLE:

⇨The following example is the low pass filter for 40m

40m LPF Toroids L10, L11 and L12

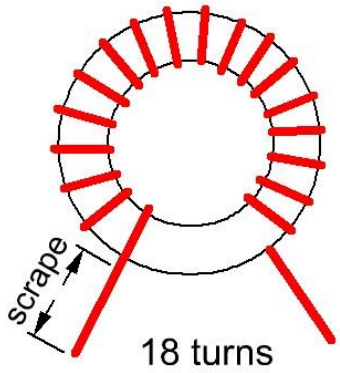
- **L10 and L12** are identical and are wound with **18 turns**.
- **L11** is wound with **20 turns**.

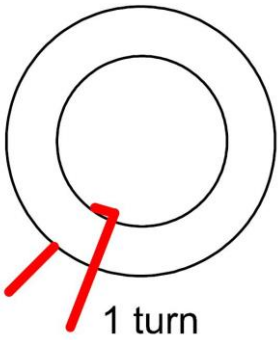
They use T37-2 (red toroids 9.5mm/0.375in outer diameter).
Cut about 28cm (10.3”) of 0.4mm diameter enameled wire and wind the **L10 and L11** toroids with eighteen (18) turns. Spread the turns evenly around the toroid and wind them tightly so that they follow the contour of the toroid and are as tight against the toroid as possible. The turns should be evenly distributed around the circumference of the toroid.
Leave pigtails of about 10-12mm (0.70”). Scrape off the enamel with a knife from the ends of the wire, in order to solder the toroid onto the board.

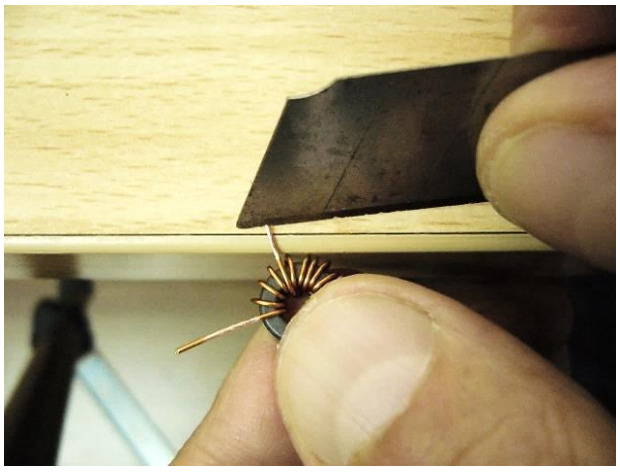
For **L11** cut about 30cm (12”) of 0.5mm diameter enameled wire and wind twenty (20) turns.
Mount and solder the three toroids in place.

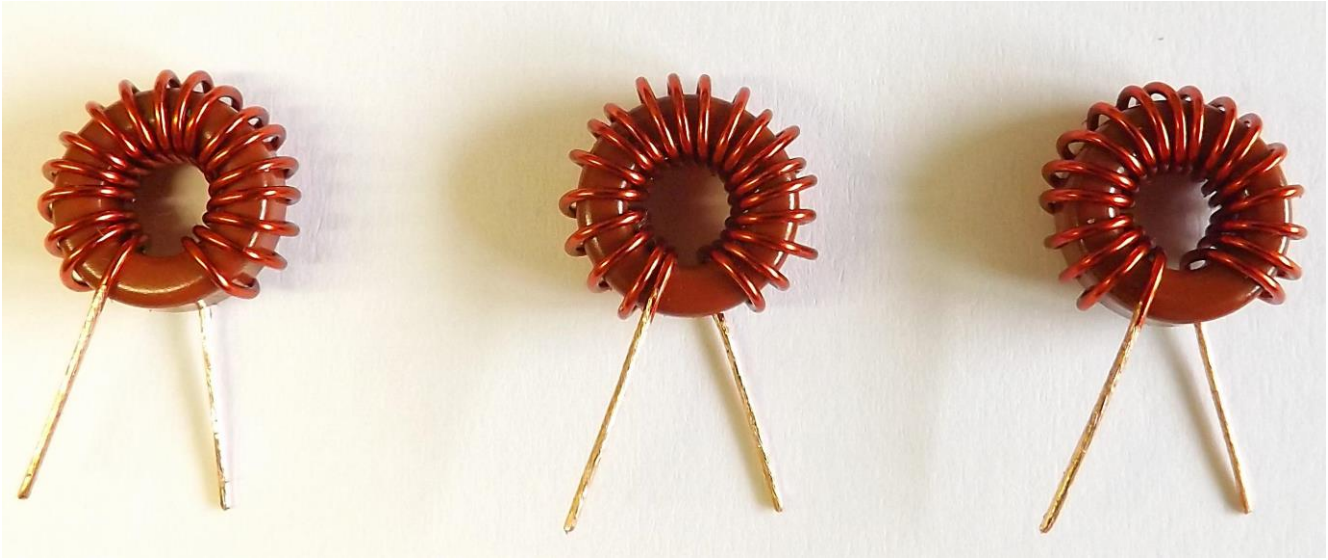
Counting the turns: Count one turn for each pass of the wire through the center of the toroid.

Important: Wind the toroid exactly as shown in the images. One turn more or less will affect the transmitter spectrum and the output power.









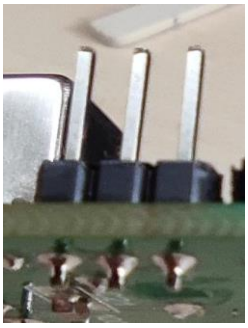
L10 (18 turns) L11 (20 turns) L12 (18 turns)

PLUG IN MODULE - WIRING AND CONNECTIONS

⇨The EGV-9Bv2_BPFLPF PCB is a plug-in module that sits on top of the EGV-9Bv2's main board.

The connection is simple, but requires special attention so that errors do not arise.

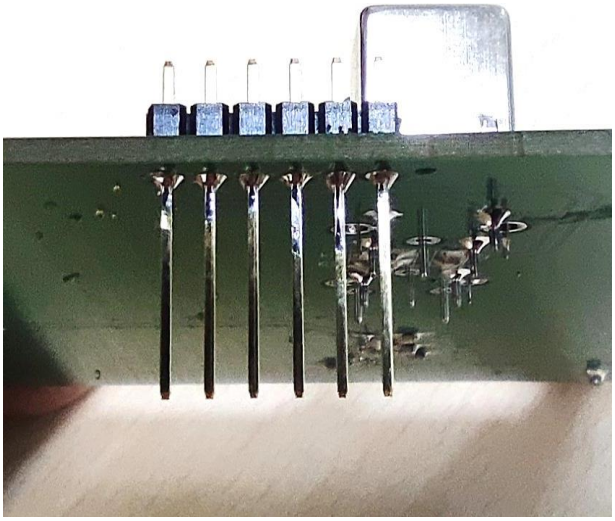
1.- The three-pin “V-TUNE” strip goes up and is soldered to the bottom side of the board.

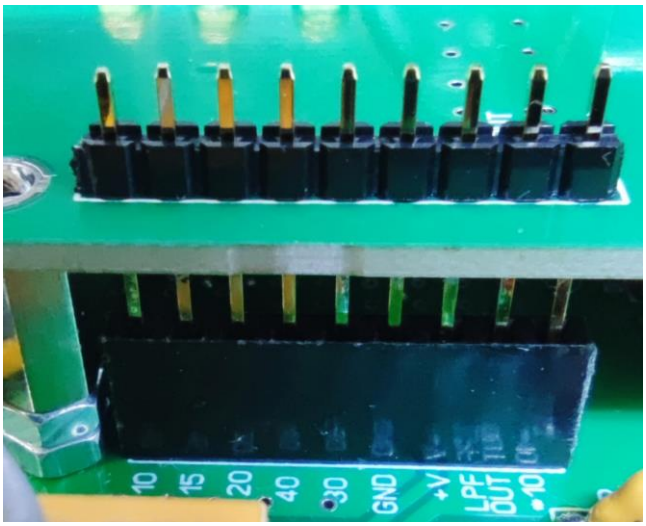


2.- The other two strips of pins go down (to connect to the main board) and are ***soldered to the top side of the board.*** Extra-long strips of pins are used. 8 extra-long pins strip for LPF switching and 6 extra-long pins strip for BPF switching.
Before soldering you should pay close attention to how tall the pins should be to accommodate the position of the plug-in board.

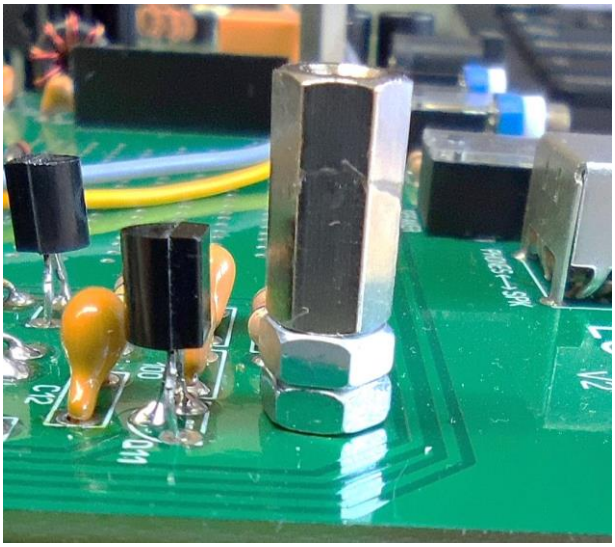
- Insert the pins from above the board (Top)
- Next put the board in place no solder the pins.
- Insert the pins into the female sockets of the main board all the way down.
- With a fine soldering iron tip, ***solder the pins on the top of the board.***
- Although it is not necessary, you can later tear off the plastic strip

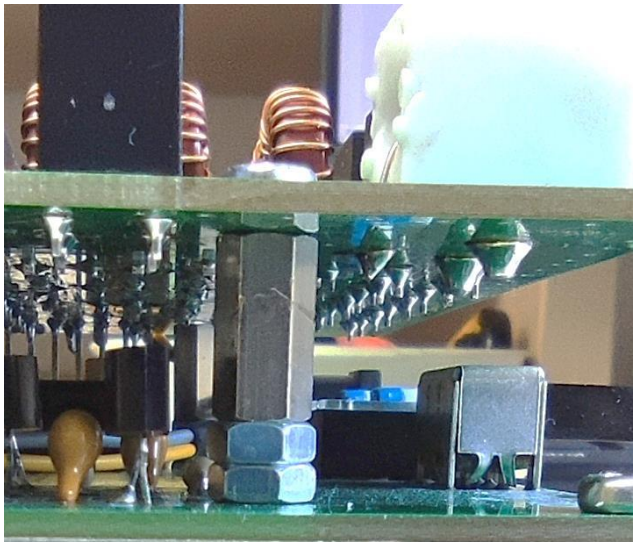
See the following pictures:





The spacers to screw the board are 10mm and you have to add two nuts to gain about 4mm in height.
To fasten to the main board, 10mm (M3x10) screws are used and to fasten the plug-in filter module, 4 or 5mm (M3x4) screws are used.
See the images.





SETTINGS AND TESTS

⇨**P**lease**, refer to the EGV-9Bv2 main board manual for L1 to L6 adjustment and checks.**

LIMITED WARRANTY

Please read carefully BEFORE building your kit

All electronic components and hardware supplied with the kit are under warranty in case of any manufacturing defect for the period of one year after purchase. The warranty does not include the transmitter final amplifier transistor.

The original purchaser has the option of examining the kit and manual for 10 days. If, within this period, the buyer decides not to build the kit, he/she may return the entire unassembled kit at their own expense for the shipping expenses. The shipping expenses and sales commissions (i.e. bank, Ebay, and PayPal commissions) included in the purchase price will not be returned.
Please, BEFORE returning a product, request instructions by email at: ea3gcy@gmail.com

Javier Solans, EA3GCY, warrants this device to function according to the specifications, provided that it is assembled and adjusted as described in this documentation, and used correctly according to all provided instructions.

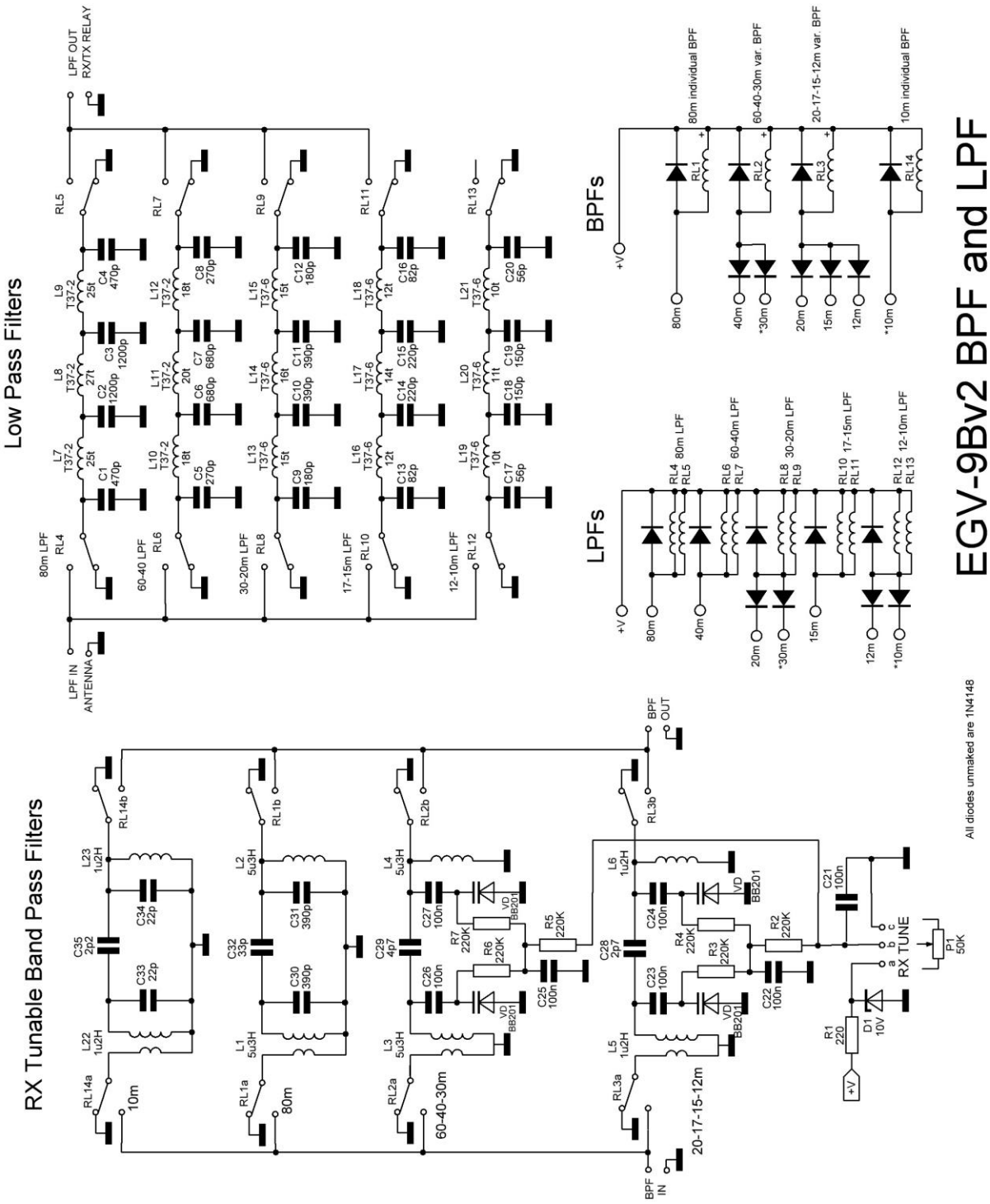
It is your responsibility to follow all the instructions in the manual, to identify all the components correctly, and to use good workmanship and proper tools and instruments in the construction and adjustment of this kit.

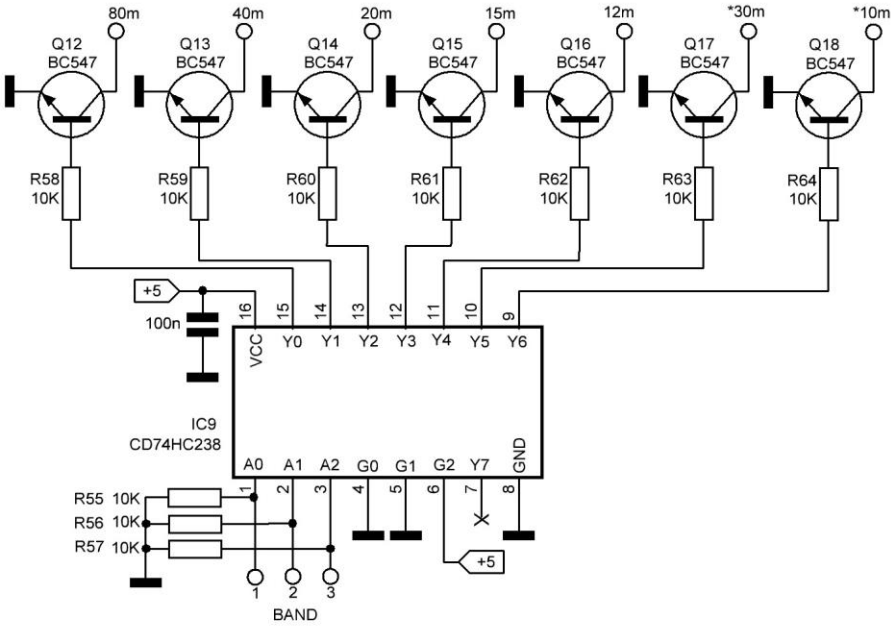
REMEMBER: This kit will not work as a commercially manufactured product; however, it can often give similar results. Do not expect great performance, BUT YOU ARE SURE TO HAVE LOTS OF FUN!

If you believe that there is a missing kit component, please do a thorough inventory of all parts using the parts list in the manual. Check all bags, envelopes and boxes carefully. If needed, you may email me and I will replace any component that you are missing. Even if you can find the exact part locally, please let me know so that we are aware of the problem to help other customers.
I can also supply any part that you have lost, damaged or broken accidently.
If you find any errors in this manual or would like to make a comment, please do not hesitate to contact me at ea3gcy@gmail.com

THANK YOU for building the
EGV-9B_BPFLPF module kit.
Enjoy QRP!
73 Javier Solans, EA3GCY

SCHEMATICS


EGV-9Bv2 BPF and LPF
Low Pass Filters
LPF OUT
RX/TX RELAY
LPF IN
ANTENNA
80m LPF
60-40 LPF
30-20m LPF
17-15m LPF
12-10m LPF
BPFs
80m individual BPF
60-40-30m var. BPF
20-17-15-12m var. BPF
10m individual BPF
LPFs
80m LPF
60-40m LPF
30-20m LPF
17-15m LPF
12-10m LPF
RX Tunable Band Pass Filters
BPF OUT
BPF IN
10m
80m
60-40-30m
20-17-15-12m
RX TUNE
All diodes unmaked are 1N4148



Switching circuit on main PCB

*30m this is an extra path for 30m drive the 60-30m BPF and 20m LPF

*10m this is an extra path for 10m drive the 10m individual BPF and 10m LPF