U-AGC/SMETER

Universal mini CAG module for receivers and S-METER generator

Assembly manual

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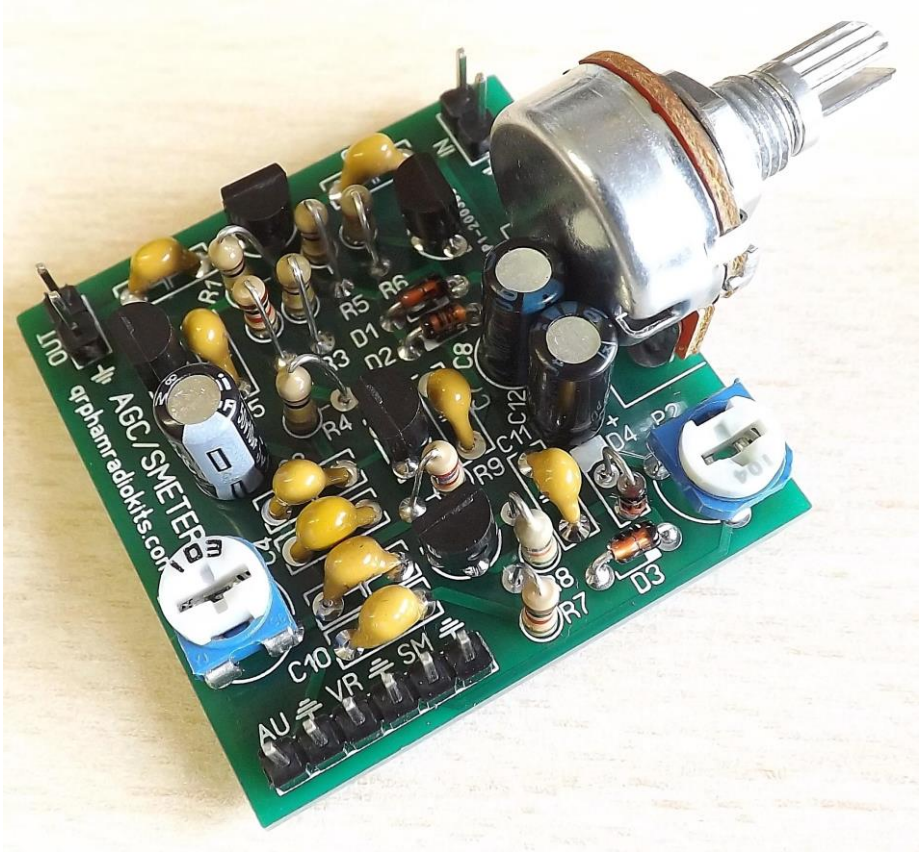


Thank you for building the ***U-AGC/S-METER*** Dual Band 40&20M SSB Transceiver kit

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

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

U-AGC/SMETER

The universal module for automatic gain control CAG and voltage generator for S-METER in "U-AGC/SMETER" kit is the ideal complement for any amateur receiver that does not have CAG and / or S-METER

The "U-AGC/SMETER" collects the audio signal from the volume potentiometer and attenuates the RX signal from the antenna input. If the audio increases, the attenuation also increases. This ensures that very strong signals decrease in level and decrease sudden changes in reception volume. The reception is more comfortable.

Furthermore, the attenuation of very strong signals at the antenna input prevents saturation of the receiver input circuits.

At the same time, the circuit generates a voltage level at the "SM" output proportional to the received audio to drive a signal panel meter (S-Meter) or an analog input microcontroller (panel instrument not included).

COMPONENTS LIST

Lista de Componentes

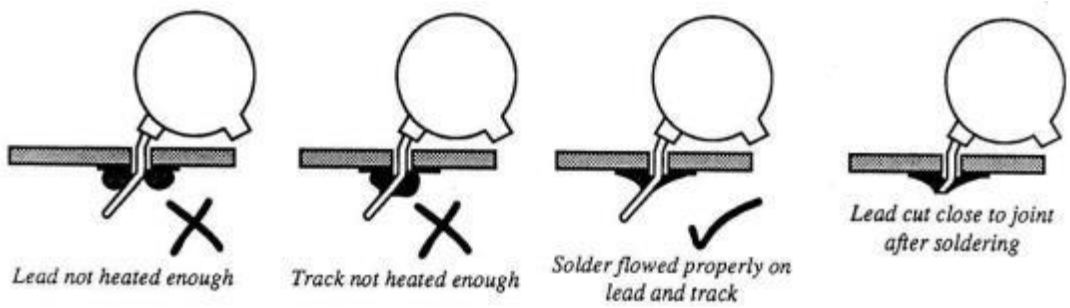
	Cantidad	Referencia	Valor	Tipo de componente	Identificación
	1	R2	1K	resistors1 K	brown-black-red
	4	R1,R3,R4,R5	100K	resistors 100 K	brown-black-yellow
	1	R6	220K	resistor 220 K	red-red-yellow
	1	R8	47K	resistor 47 K	yellow-violet-orange
	1	R9	4K7	resistor 4K7	yellow-violet-red
	1	R7	470Ω	resistor 470Ω	yellow-volet-brown
	1	P1	10K	Adjustable resistor 10 K	103
	1	P2	100K	Adjustable resistor 100 K	104
	1	RX-GAIN	1K	Potentiometer 1 K	1K
	8	C1,C3,C5,C6,C7,C9,C10,C11	100n	Capacitors 100n	104 o 0.1
	1	C4	1n	Capacitor 1n	102 o 0.001
	1	C8	1uF	Electrolitic capacitor 1uF	1uF
	1	C2	10uF	Electrolitic capacitor 10uF	10uF
	1	C12	4,7uF	Electrolitic capacitor 4,4uF	4,7uF
	4	D1, D2, D3, D4	1N4148	Diodes	4148
	2	Q1, Q2	BC547	BC547 transistors	BC547
	2	Q3, Q4	2N7000	2N7000 transistors	2N7000
	1	IC1	78L05	5V Regulator	78L05
	10	Male pins	--	1 of 6 pin strip, 2 of 2 pins strip	--
	1	PCB U-AGC/SMETER	--	Printed circuit board 40 x 40mm	--

TIPS FOR BUILDERS WITH LITTLE EXPERIENCE

Tools required:
- Fine-tip soldering iron of about 30W, small wire cutters for cutting component leads, wire strippers, long-nose pliers, needle-nose pliers, X-Acto knife, screwdriver for M3 screws, alignment tool for adjusting IF transformers.
- You will need a good light and a magnifying glass to see the fine print on the components and other assembly details.

Instruments required:
- Multimeter, frequency counter or HF receiver, RF power meter, dummy load of about 10W - 50ohms, RF signal generator (desirable but not essential).

Soldering:
There are two essential things to keep in mind to ensure the proper functioning of a kit. The first is to put the component into its proper place on the circuit board, the second is good soldering.



To solder properly, you must use a high-quality solder for electronics and the correct type of soldering iron. Use a small soldering iron that has a fine, pointed tip. The soldering iron should be about 30 watts (if it is not thermostatically controlled). Use only solder intended for electronic soldering; NEVER use extra flux. You should hold the hot soldering iron in contact with both the circuit board and the component lead for about two seconds to heat them up. Then, keeping the soldering iron in place, touch the solder at the junction of the component lead and circuit board trace and wait about two seconds or so until the solder flows between the lead and the trace to form a good joint. Now remove the soldering iron. The soldering iron should have been in contact with the joint for a total time of about 4 seconds. After soldering each joint, you should clean the soldering tip, removing any excess solder. This prevents mixing in old solder and residues from previous soldering operations.

Diodes
Be careful to observe the correct polarity of the diodes. There is a dark-colored band towards one end of the diode. This band should be oriented towards the line printed on the component outline of the circuit board.

Electrolytic capacitors:
These must be placed with the correct polarity. The positive lead (+) is always the long lead. The negative terminal (-) is the short lead and is marked by a stripe on the body of the capacitor. Make sure that the positive lead of the capacitor goes through the hole marked with a "+" on the circuit board.

RECOMMENDED MOUNTING SEQUENCE

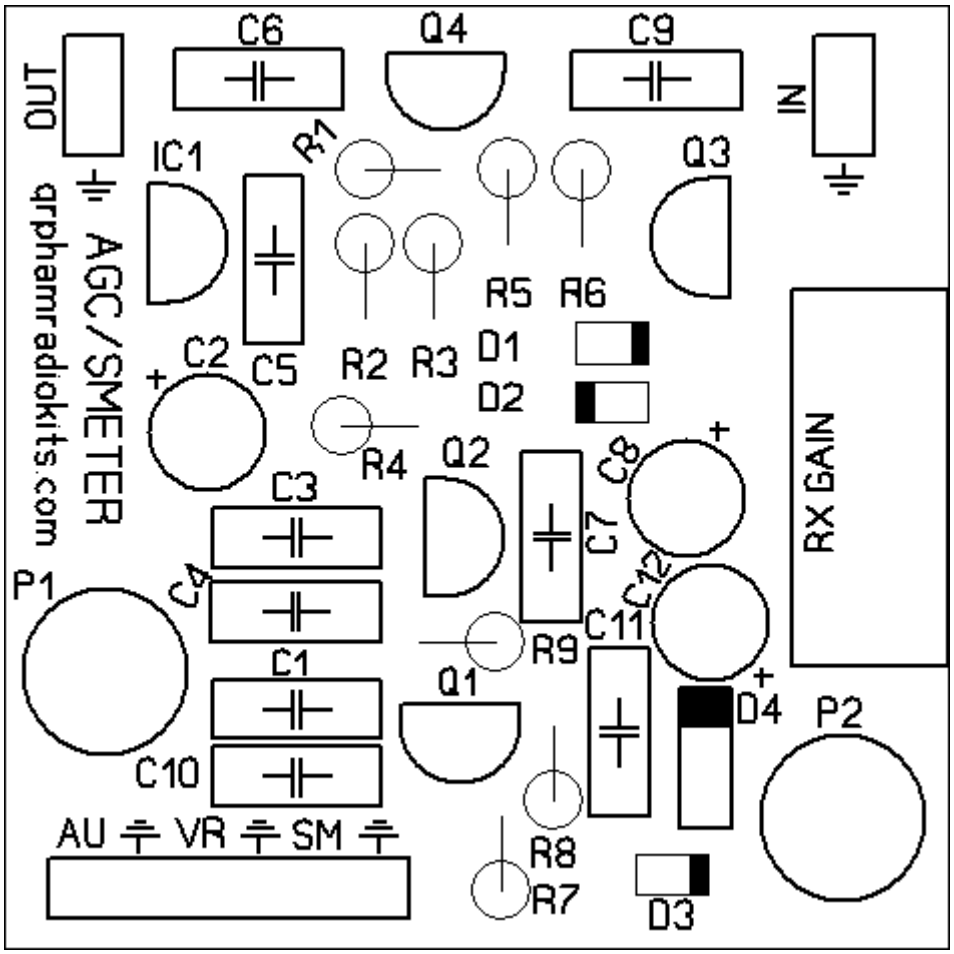
IMPORTANT: The references printed on the PCB are very close together. Before soldering, make sure you place each component in its correct place.

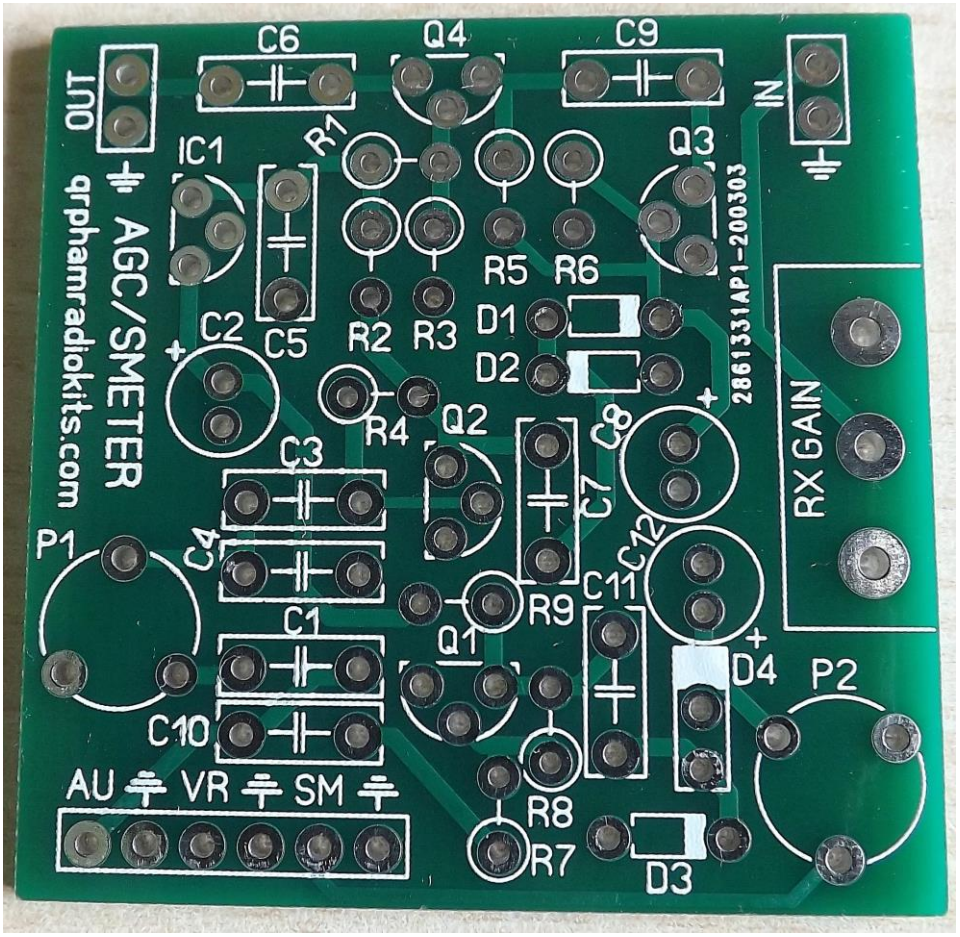
It is recommended to carry out the assembly work in the following order:

❶ Following the components list, solder resistors R1 to R9. They all go vertically (look at the images).

❷ Place and solder the adjustable resistors P1 10K marked 103 and P2 100K marked 104.

❸ Install and solder diodes D1 through D4 per board drawing. All are 1N4148. D4 is placed vertically, the others horizontally.





❹ Next install and solder capacitors. Pay attention not to confuse the C1 with the C4 that are very close together. The C2, C8 and C12 are electrolytic capacitors and must be placed with their longest terminal coinciding with the “+” sign printed on the board.

❺ Place and solder the IC1 78L05 5V regulator in position show by the outline of the plate.

❻ Place and solder transistors BC547 Q1, Q2 and 2N7000 Q3, Q4.

❼ Attach and solder the 1K potentiometer named RX-GAIN (if there is, bend and break the small protruding tab so it won't bother when you screw it on the front panel).

❽ Place and solder the header pins at the places marked “IN”, “OUT”, and the 6-pin strip “AU-VR-SM”.

Note: *If you do not want to use the “RX-GAIN” potentiometer and always keep the gain at its maximum (the CAG will continue to act the same), you must bridge the central hole of the potentiometer and the one on its right (looking from the front).*

SETTING

The “RX-GAIN” potentiometer work as an adjustable attenuator for the input signal from the antenna to the receiver. You can manually attenuate the signal when you receive a too strong station.

P1 Adjusts the sensitivity of the CAG, that is, at what signal level the CAG will begin to work.

It is recommended adjust P1 to the maximum (clockwise).

P2 adjusts the voltage level at the S-Meter “SM” output. It will need to adjust according to the meter type “S-Meter” that you use.

P2 usually adjusts to more than half of its travel.

ANNEXES

⇨ AGC Decay time.

The CAG decay time can be increased if you think it is too slow. For this, the values of R6 and C8 must be increased. Try 1M at R6 and 2.2uF at C8.

This modification will depend on your listening habits.

⇨ S-METER Increase sensitivity.

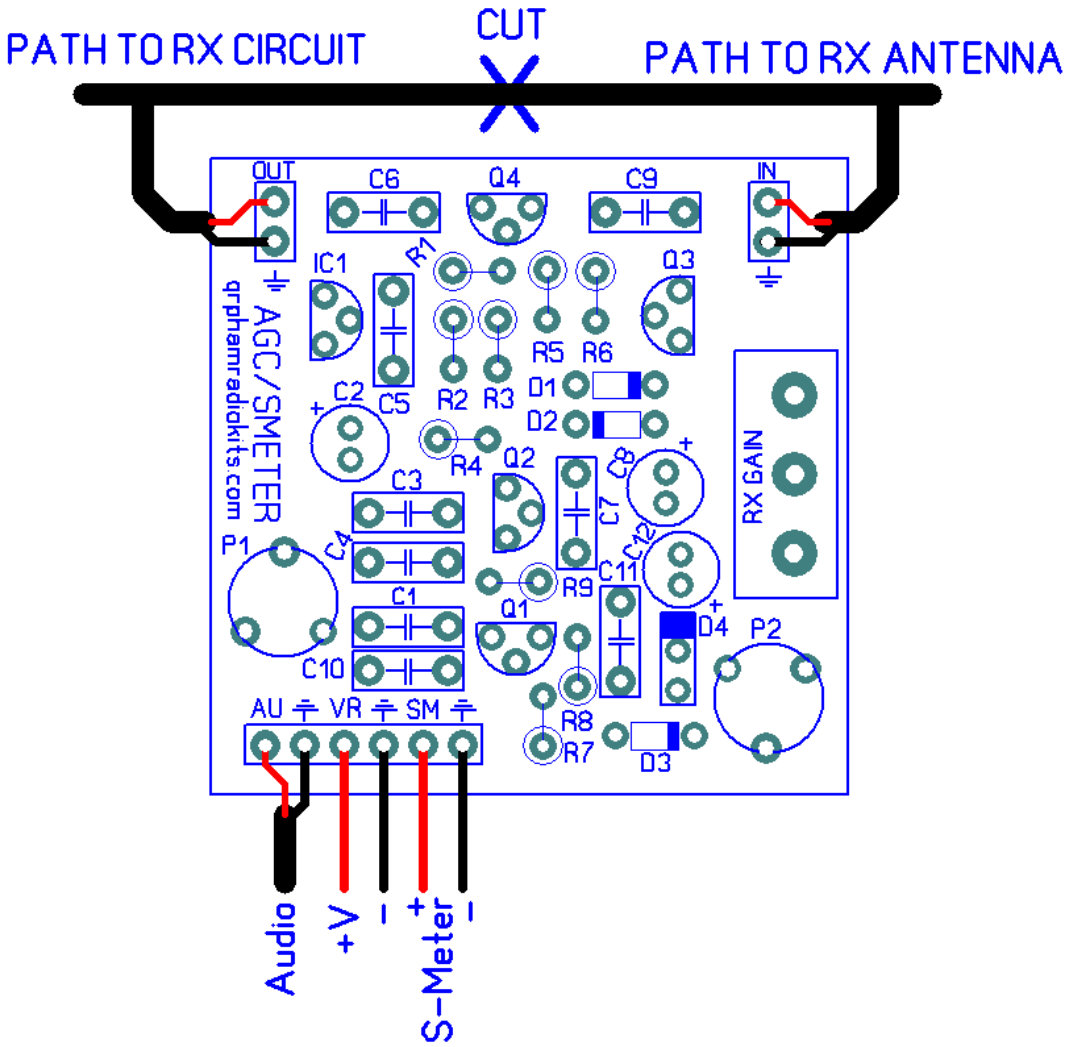
To increase the sensitivity of the S-Meter you can change R8 to 100K and R9 to 1K5.

GENERAL WIRING

Before you start, you must located the reception path that comes from the antenna (50ohms). If it is a transceiver, **MAKE SURE** that this line is exclusive to receive, it must be after the RX / TX switch and will not pass the transmit signal at any time.
Connections are very easy.

- The “AU” audio input must be connected to the lateral terminal of the volume potentiometer (contrary to ground) and to GND.
- The supply input “VR” to power supply 12-14V.
- You must cut the path of the reception signal coming from the antenna and wire it to the “IN” terminals of the U-AGC / SMETER and the return signal to the “OUT” terminals.
- The “SM” output can be connected to a needle meter or to micro-controller input to read the voltage proportional to the received audio signal*. It is recommended that the microcontroller's voltage input be protected for 5V maximum since at some point this output may exceed this level.*

Note: *The voltage output "SM" is an approximate level of the received signal. It is not a calibrated output and does not have a linear relationship with the received signal, you must adapt your system to the appropriate levels.*

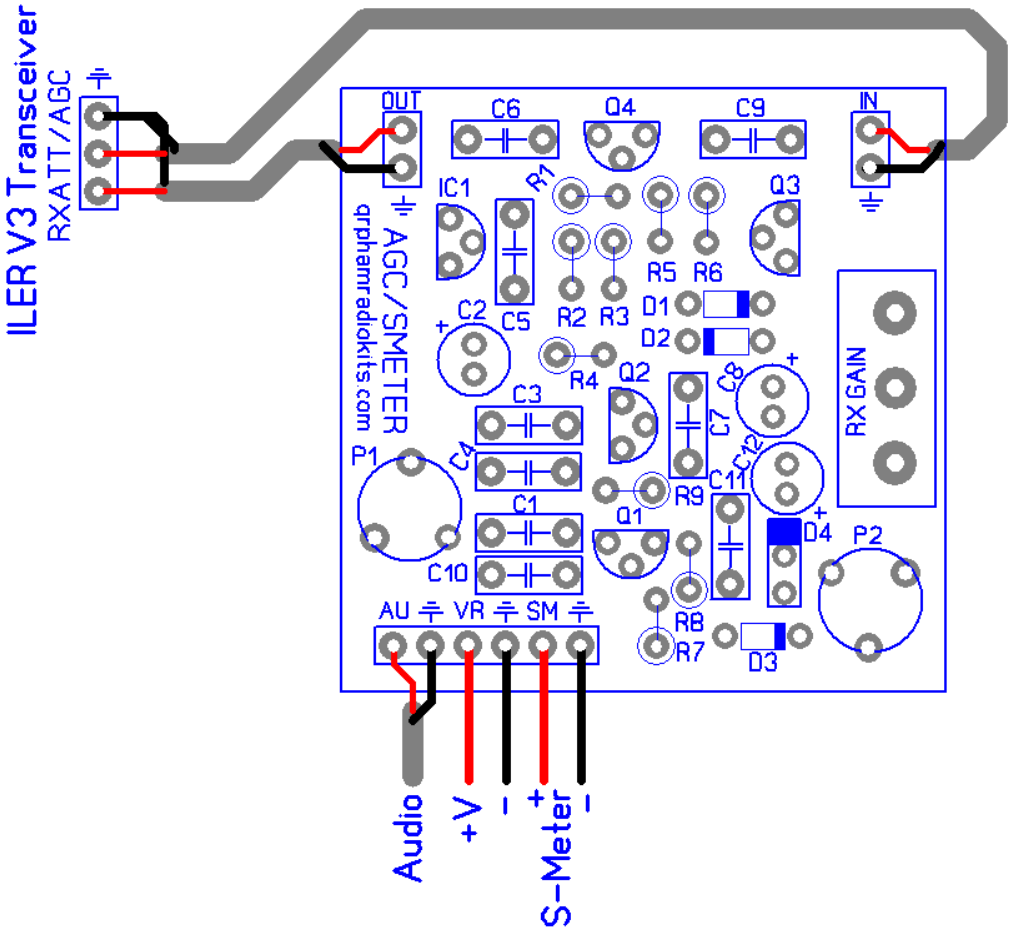


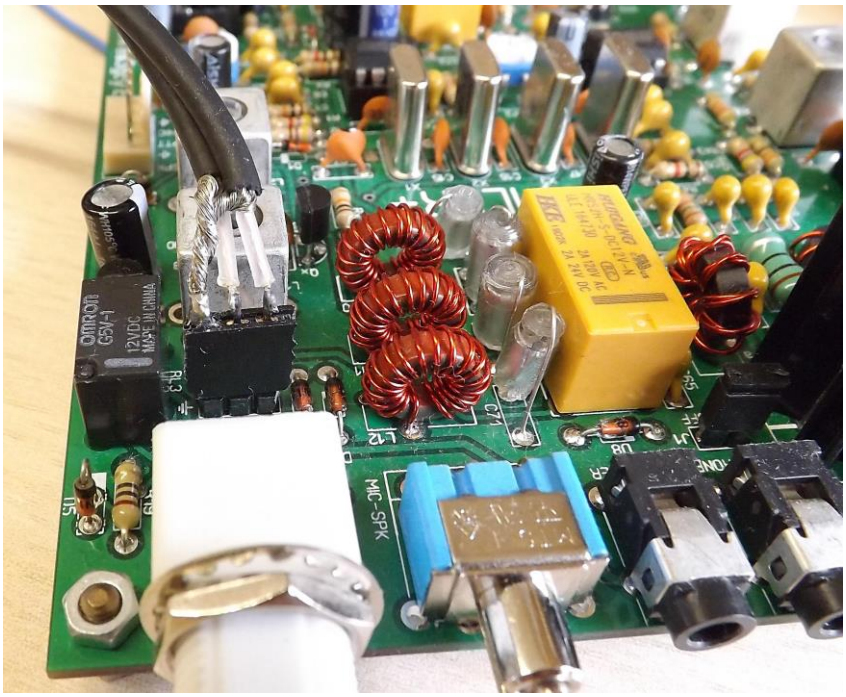
Note:
If the distances are more than 2 or 3 cm, use shielded cable for both RF and Audio signals.
The power supply is 12-14V (VR and GND terminal)

WIRING TO ILER V3 kits

The connections to the ILER V3 transceivers are as follows:

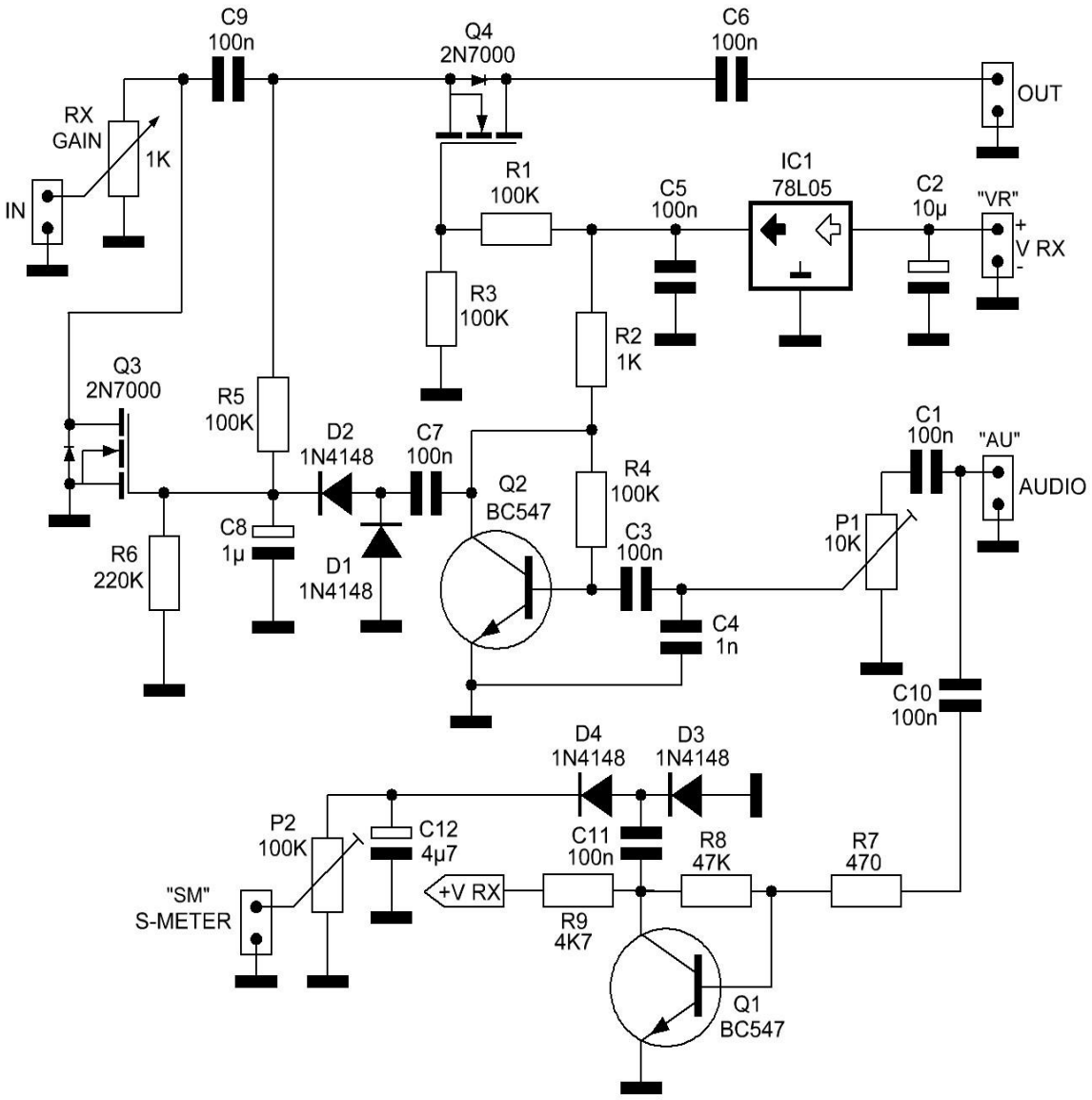
- The audio input “AU” must connected to J3 “Audio” terminals of ILER board.
- The power input “VR” to 12-14V general power supply.
- The signals pins from “RXATT/AGC” on ILER board to “IN” y “OUT” headers pin as show in the picture.
- At the “SM” output it can be connected to a needle panel meter or to the input of a micro-controller to read the proportional voltage to the received audio signal. It is recommended that the microcontroller's voltage input be protected for 5V maximum since at some point this output may exceed this level.





Notes:
If the distances are more than 2 or 3 cm, use shielded cable for both RF and Audio signals.
The board power is 12-14V (VR and GND terminal)

SCHEMATIC



U-AGC/SMETER

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 ***U-AGC/SMETER*** kit.
Enjoy QRP!
73 Javier Solans, EA3GCY