

Read This Page First

- If you are reading this you know the manuals are always available at QRPKITS.com.
- This is version 8.0 of the manual dated 4/27/2016.
- There is no need to print out the whole assembly manual unless you want a copy. Print the Parts List and Schematic then view the rest of the manual on a computer, laptop, or tablet. The Parts List has columns for inventory and construction.
- Please take time to inventory the parts before starting. Report any shortages to QRPKITS.com (In many cases it may be faster and cheaper to pull a replacement from your parts supply, but please let us know if we missed something.)

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QRPKITS.COM - Easy Receiver



Description

The Easy Receiver kit from Qrpkits.com is designed to be easy to build and use. It covers approximately 75kHz of the 40M band (other bands available soon) and can be assembled in 1-2 hours. It has no toroids to wind and only one adjustment (trimcap) to set the frequency. It is a direct conversion design employing a front end bandpass filter, NE602 mixer and LM386 audio amplifier.

Our Easy Receiver is designed to work with our Easy Transmitter, Easy Audio Filter, Easy Tuner and Easy Keyer and Easy TR switch to make a complete QRP station. These boards are designed to stack together to produce a compact assembly.

Support

PACIFIC ANTENNA

QRP KITS.COM

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Tools Needed

- Temperature Controlled Soldering Station with small tip or 15-35 watt soldering iron with small tip.
- Solder 60/40 or 63/37 Tin-Lead
- Small Diagonal Cutters
- Small Needle Nose Pliers
- Pencil, Pen, and/or Highlighter
- BRIGHT work light

Optional

- Magnifying headpiece or lighted magnifying glass.
- Multi-meter
- Solder Sucker or Solder Wick
- Small multi-blade Screw Driver
- Knife or Wire Stripper
- Small Ruler
- Cookie Sheet to build in and keep parts from jumping onto the floor.

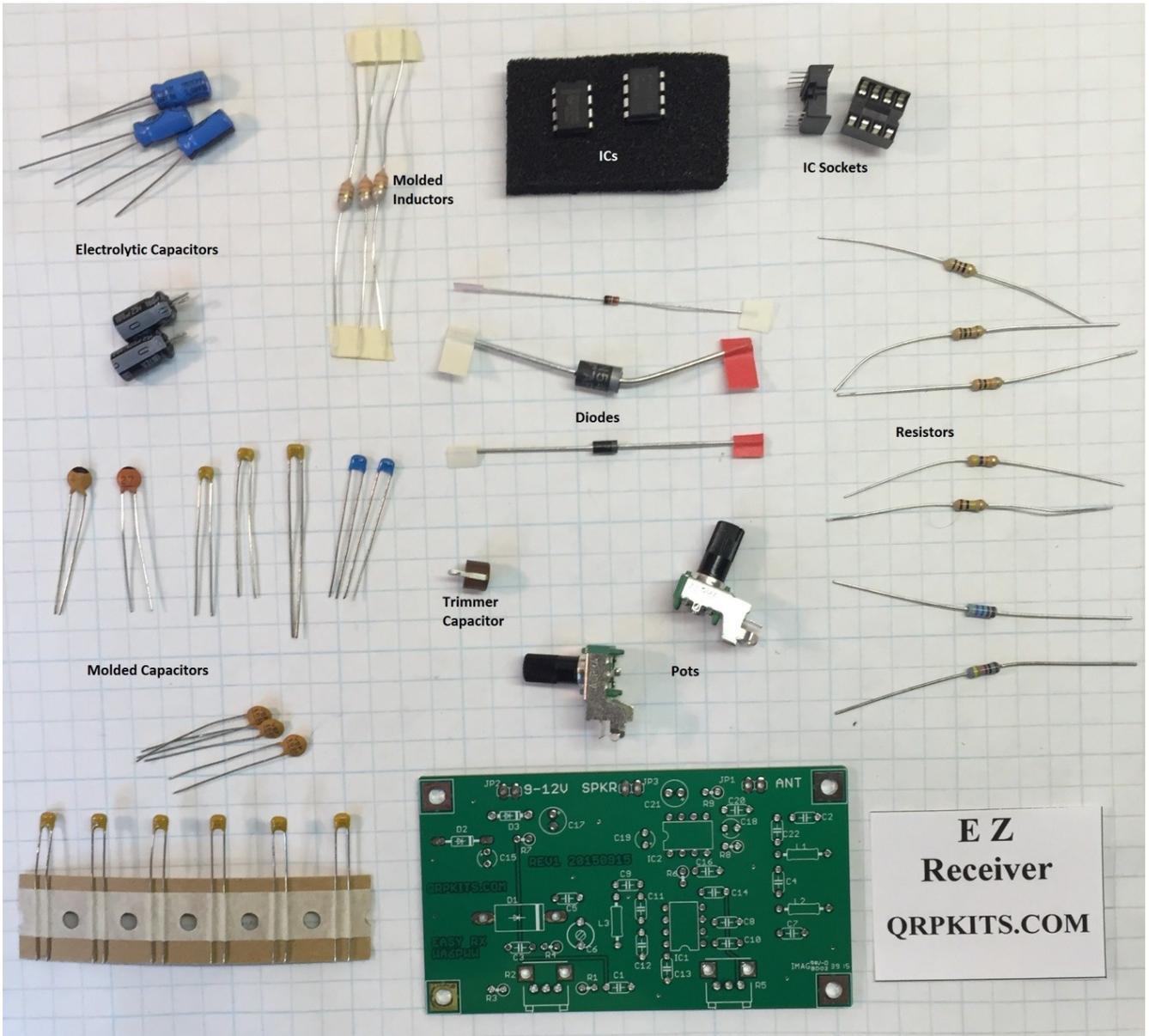
Construction Techniques

- The Parts List has columns for inventory and construction.
- You can insert several parts at a time onto the board. When you insert a part bend the leads over slightly to hold the part in place, then solder all at the same time. Clip the leads flush.
- Most parts should be mounted as close to the board as possible. Transistors should be mounted about 1/8" above the board. Solder one lead on ICs or IC sockets and then check to make sure the component is flush before soldering the remaining leads.
- Use a Temperature Controlled Soldering Station with small tip or 15-35 watt soldering iron with small tip. Conical or very small screw driver tips are best.
- DO NOT use a large soldering iron or soldering gun.
- If you are a beginner, new to soldering, there are a number of resources on the web to help you get on the right track soldering like a pro. Google Soldering Techniques.
- Please take time to inventory the parts before starting. Report any shortages to QRPKITS.com (In many cases it may be faster and cheaper to pull a replacement from your parts supply, but please let us know if we missed something.)
- Pre-sorting the resistors and capacitors can speed up the assembly and reduce mistakes.
- There is no need to print out the whole assembly manual unless you want a copy. Print the Parts List and Schematic (last two pages) then view the rest of the manual on a computer, laptop, or tablet.
- Inventory and Parts List
- Use the first column to check the parts as you inventory them.
- Use the second column to check the parts as you install them.

Inventory and Parts List

Inventory	Inst.	Qty	Parts	Value	Identification	Description
		1	R9	10 Ohm	brn-blk-blk-gold	RESISTOR, 1/4W
		1	R7	150 Ohm	brn-grn-brn-gold	RESISTOR, 1/4W
		1	R8	10K Ohm	brn-blk-org-gold	RESISTOR, 1/4W , 5%
		1	R6	47K Ohm	yel-vio-org-gold	RESISTOR, 1/4W , 5%
		1	R4	100 K Ohm	brn-blk-yel-gold	RESISTOR, 1/4W , 5%
		1	R10	33 K Ohm	Org-org-org-gold	RESISTOR, 1/4W , 5%
		1	R1	4.75K 1%	yel-vio-grn-brn-brn	RESISTOR, 1/4W , 1%
		1	R3	432 1%	yel-org-red-blk-brn	RESISTOR, 1/4W , 1%
		1	C4	4.7pF	4.7	CAPACITOR, disk ceramic
		1	C5	27pF	27	CAPACITOR, disk ceramic
		1	C7	150pF	151	CAPACITOR, monolythic
		1	C22	180pF	181	CAPACITOR, monolythic
		1	C9	220pF	221	CAPACITOR, monolythic
		2	C11, C12	470pF	471	CAPACITOR, monolythic
		3	C2, C10, C16	1000pF	102	CAPACITOR, monolythic
		6	C1, C3, C8, C13, C14, C20	0.1uF	104	CAPACITOR, monolythic
		3	C15, C18, C19	10uF	10 uf	ELEC. CAPACITOR 25V+
		2	C17, C21	100uF	100uf	ELEC. CAPACITOR 25V+
		3	L1, L2, L3	3.3uH	org-org-gold-silver	INDUCTOR, molded
		1	D2	1N5234	234B (glass body)	DIODE, Glass
		1	D1	1N5401	1N5401	DIODE, Large Black Plastic
		1	D3	1N5817-B	1N5817	DIODE, Small Black Plastic
		2	SC	Sockets		IC Sockets, 8 pin
		1	IC2	LM386N-4	LM386N	Audio Power Amplifier, 8 pin Ic
		1	IC1	NE602	NE602A	NE602 or SA612, 8 pin IC
		1	C6	50pF	brn	Trimmer capacitor, brown
		1	R5	10K A	A10K	Green Potentiometer, Volume
		1	R2	10K B	B10K	Green Potentiometer, Tuning
		1	BNC	BNC		BNC Antenna Connector
		1	Phone Jack	Audio		3.5mm Audio Jack
		1	Battery Conn.	9V		9V Battery Connector
		12"	Wire	Wire	2-12 inch sections	Hookup wire, 2 colors
		2	Knob	Knobs	.55" knobs	Small Knobs for Potentiometers
		1	PCB	PCB	Rev 1A or B	Easy RX Circuit Board

Parts Identification:



Inserting the Parts

First, install the two IC sockets, making sure to match the end with the notch to the board outline.

- 2 SC Sockets IC Sockets, 8 pin

Resistors

Sort the resistors by value insert and solder them smallest value first, largest value last. Be sure to check the color code for each resistor as you install. [Measuring with an Ohm meter is also a good idea.]

- 1 R9 10 Ohm brn-blk-blk-gold
- 1 R7 150 Ohm brn-grn-brn-gold
- 1 R8 10K Ohm brn-blk-org-gold
- 1 R10 33K Ohm org-org-org-gold
- 1 R6 47K Ohm yel-vio-org-gold
- 1 R4 100 K Ohm brn-blk-yel-gold
- 1 R1 5.75K 1% yel-vio-grn-brn-brn
- 1 R3 432 1% yel-org-red-blk-brn

Ceramic and Molded Capacitors

First insert and solder the molded capacitors.

- 1 C4 4.7pF 4.7 CAPACITOR, disk ceramic
- 1 C5 27pF 27 CAPACITOR, disk ceramic
- 1 C7 150pF 151 CAPACITOR, monolithic
- 1 C22 180pF 181 CAPACITOR, monolithic
- 1 C9 220pF 221 CAPACITOR, monolithic
- 2 C11, 470pF 471 CAPACITOR, monolithic
- C12 470pF 471 CAPACITOR, monolithic
- 3 C2, 0.001uF 102 CAPACITOR, monolithic
- C10, 1000pF 102 CAPACITOR, monolithic
- C16 1000pF 102 CAPACITOR, monolithic
- 6 C1, 0.1uF 104 CAPACITOR, monolithic
- C3, 0.1uF 104 CAPACITOR, monolithic
- C8, 0.1uF 104 CAPACITOR, monolithic
- C13, 0.1uF 104 CAPACITOR, monolithic
- C14, 0.1uF 104 CAPACITOR, monolithic
- C20, 0.1uF 104 CAPACITOR, monolithic

Electrolytic Capacitors

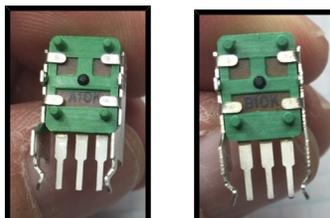
Now insert and solder the electrolytic capacitors. These capacitors are polarized. The longer lead is the positive + (plus) lead. The positive hole is marked on the circuit board with a + symbol. The shorter lead is the - (minus) lead. The negative lead is also marked with a black bar on the side of the capacitor.

<input type="checkbox"/>	3	C15,	10uF	10uF	ELECTROLYTIC CAPACITOR 25V+
<input type="checkbox"/>		C18,	10uF	10uF	ELECTROLYTIC CAPACITOR 25V+
<input type="checkbox"/>		C19	10uF	10uF	ELECTROLYTIC CAPACITOR 25V+
<input type="checkbox"/>	2	C17,	100uF	100uF	ELECTROLYTIC CAPACITOR 25V+
<input type="checkbox"/>		C21	100uF	100uF	ELECTROLYTIC CAPACITOR 25V+

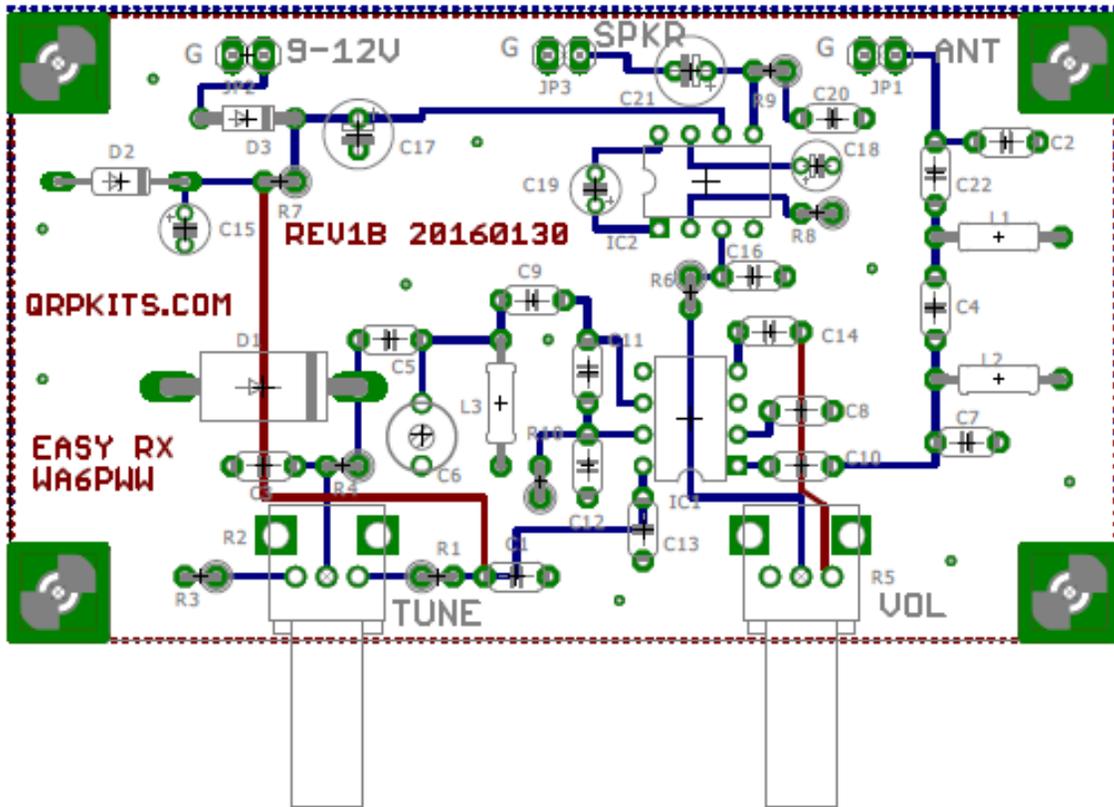
Remaining Parts

<input type="checkbox"/>	3	L1,	3.3uH	org-org-gold-silver	INDUCTOR, molded
<input type="checkbox"/>		L2,	3.3uH	org-org-gold-silver	INDUCTOR, molded
<input type="checkbox"/>		L3	3.3uH	org-org-gold-silver	INDUCTOR, molded
<input type="checkbox"/>	1	D2	1N5234	234B (glass body)	DIODE
<input type="checkbox"/>	1	D1	1N5401	1N5401	DIODE
<input type="checkbox"/>	1	D3	1N5817-B	1N5817	DIODE
<input type="checkbox"/>	1	IC2	LM386N	Audio Power Amplifier, 8 pin Ic"	
<input type="checkbox"/>	1	IC1	NE602A	NE602, 8 pin IC	
<input type="checkbox"/>	1	C6	50pF	brown	Trimmer capacitor, Note that C6 has a flat and round side. It should be installed so that the flat side is oriented toward C5
<input type="checkbox"/>	1	R5	A10K	Green	Potentiometer, Horiz, Audio
<input type="checkbox"/>	1	R2	B10K	Green	Potentiometer, Horiz, Linear

The last parts to install are the two potentiometers. The A10K and B10K identification marks are on the back of the pots and are a bit difficult to read. Use lots of light. The pot marked A10K is the 10K Audio Pot. The pot marked B10K is the Linear Pot.



Board Layout



Final Assembly and Packaging

Your easy receiver kit is now completed. For packaging and testing, you will find included in the package, an audio connector, 9V battery connector and a BNC along with some hookup wire. For initial testing, you can just temporarily connect short wires to the board pads and use clip leads for connection of antenna and audio out.

To power your receiver, you will need to supply a source of clean dc power in the range of 9-12V to JP2. This can be from a battery source or from a well filtered dc supply.

When looking at the board as shown in the board layout, the positive power lead is connected to the leftmost hole of JP2 and the ground connection to the right side hole. An inline fuse is recommended and should the connections be reversed, Diode D3 serves to protect against reverse polarity damage to the receiver components.

A speaker or headphone jack should be connected to JP3. In this case, the ground connection is the leftmost hole and the audio connection is the right hold of JP3.

Antenna input is through JP1. The ground side of the antenna is connected to the left hole of JP1 and the antenna to the right side hole of JP1. The BNC connector that is supplied can be

used for connecting an external antenna or alternatively, a section of wire at least 8-10ft long can just be connected to JP1 as a temporary antenna.

Setup and Testing

The Easy Rx has a tuning range of approximately 50-75kHz. This will cover the low end of 40M for example where most of the CW activity is found including QRP frequencies such as 7.030 and 7.040.

First verify that when you power up the Easy Rx, and connect an antenna or section of wire, you should hear static and maybe some signals in the headphones. Turning R2 (the left side potentiometer) will change the received frequency and R5 (the right side potentiometer) will adjust the volume of the background static and any signals received.

To setup the receiver for reception on the desired frequency, only one adjustment is required. This is to set the trim capacitor C6 for reception at the desired frequency. This step will be aided if you have a receiver that covers the same band and has capability for receiving CW signals.

As the Easy receiver is a direct conversion design, its oscillator runs continuously and can be heard on any nearby receiver. In this case, an antenna lead connected to the nearby receiver can be placed near the Easy Rx board and you will hear a tone on the receiver corresponding to the local oscillator frequency of the Easy Rx.

To adjust C6, ideally you should use a plastic tool. However, if the trim-cap is installed correctly, (with the flat side toward C5) the part you are touching is grounded and therefore, a small metallic screwdriver will be OK to use.

If using a receiver, tune it to a frequency such as 7.025 or other frequency on which you want the Easy Rx reception range to be centered. Place R2 (the tuning knob on the left) to the middle of its range and then turn C6 slowly. You should hear a tone as the local oscillator of the Easy Rx moves across your other receiver. You will need to turn very slowly and listen carefully as it may move quickly across the desired frequency. Once you hear a tone on your receiver, stop adjusting C6 and you should hear a steady tone in your other receiver. You can now connect an external antenna to the Easy Rx and use R2 to tune around. If the band is active, you should hear some CW signals. To set the lower range to a desired frequency, rotate the tuning control (R2) fully counterclockwise. This will place it at the lowest frequency. Then using your external receiver set to the lowest frequency you want to use (such as 7.00 MHz for 40 meters) adjust C6 until you hear the Easy Receiver oscillator as a tone in your receiver. Turning R2 clockwise will move you up in frequency and you should be able to tune up to approximately 7.075 MHz with R2 fully clockwise.

A crystal controlled transmitter can also be used as a signal source for setting the frequency of the Easy Rx. To do this, you would simply activate the transmitter, preferably into a dummy load and with a short wire on the Easy RX, set R 2 to the middle of its range and tune C6 while listening for the transmitter tone. Be sure not to use an external antenna on the TX so not to cause interference to others.

Troubleshooting

The easy RX is designed to be a simple kit to build and to use. However, occasionally, problems may happen. In our experience, these are often soldering issues (shorts or cold solder joints) or component misplacement Here are a few things to check if the kit does not function as it should.

1. Verify component placement, including resistors and capacitors
2. Inspect all solder joints with a magnifying glass, looking particularly for any that may have small whisker shorts or which look dull and blotchy indicating a cold solder joint.
2. Verify orientation of the two ICs in their sockets. One end of the sockets will have a notch and that should be on the same end as the notch in the IC package as well as a dot or other marking for pin 1 of the IC. See the photo on page 3 and diagram on page 7 for examples of proper orientation.
3. Check for correct DC voltages to ground at the following points in the circuit:
 - Right side of JP2- should be equal to power supply voltages
 - Band end of D3- should be equal to power supply minus approximately 0.7V
 - Pins 8 of IC1- should be approximately 6.2V
 - Pin 6 of IC2 -should be equal to power supply minus approximately 0.7V

If the Easy RX only makes a low level HISS in the speaker or headphones, check the local oscillator operation by placing it near another receiver and listening for the Easy RX local Oscillator, Tune C6 if needed to locate the oscillator in the second Receivers pass band. If there is no oscillator signal then carefully check the circuit around the IC1, NE602/612, to be sure the parts are correct and properly soldered.

If during tune up the local oscillator could be heard in the second RX but the Easy RX has no output from the speaker/headphones then first touch the junction of R6/C16 the speaker should make a 60 HZ humming sound. If this happens then check the parts and soldering

around the volume control. If there is no HUM then check the parts and soldering around IC2, LM386.

We hope you enjoy your Easy RX kit!

If any questions, or problems with your kit, please contact us at grpkits.com@gmail.com and we will be happy to assist you.

Schematic

