

# DL-1A

RF dummy load - 50 20W

## Assembly manual

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[ea3gcy@gmail.com](mailto:ea3gcy@gmail.com)

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Thank you for constructing the **DL-1A** dummy load kit

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

## SPECIFICATIONS

- Power dissipation of 20W for 30 seconds maximum. 10W for 1 minute ON, 1 minute OFF.
- Impedance 50
- Working frequency of: 0 to 500MHz.
- SWR bandwidth: 0 to 30MHz @ 1.1  
30 to 150MHz @ 1.2
- Average precision of power measurement: 10%

## PARTS LIST

1 Box 55 x 85 x 22 mm	1 PCB printed circuit board DL-1A
8 Resistors 100 3W	1 Capacitor of 10nF (103)
1 Schottky diode 1N5711	1 female BNC panel-mount jack
3 "banana" plug jack, 2mm	

## TIPS FOR FIRST TIME BUILDERS

### Tools required:

- A 30W soldering iron, good-quality electronic-type solder, small diagonal wire cutters, needle-nose pliers, tweezers, screwdriver and a wrench for the nuts of the BNC connector and 2 mm jacks (small adjustable wrench or fixed wrenches of 7 and 4 mm).
- You will need good lighting and a magnifying glass to see the fine print on the components and other assembly details.

### Soldering:

There are two important things which need to be done to insure successful operation of a kit. The first is to put the component into the proper place on the circuit board; the second is good soldering.

To solder properly, you must use an electronic-type solder of the highest quality possible and the correct type of iron. Use a quality-brand soldering iron with a short, fine-pointed tip. For this kit, the soldering iron should be about 30-35 Watts (if it is not thermostatically controlled). Use only high-quality electronic-type solder. NEVER use any 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 lead and 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 work piece for a total time of about 4 seconds. When soldering leads that connect to large trace surfaces, you will need to preheat the junction for a little longer so that the solder flows correctly.

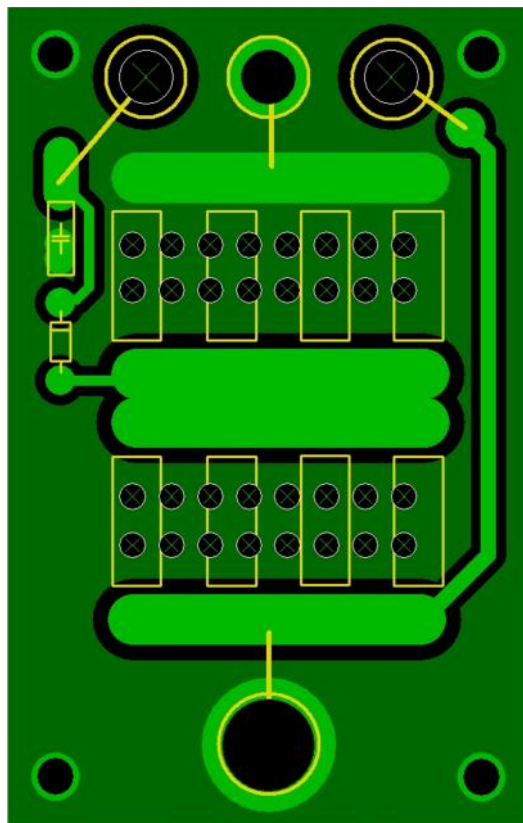
You should clean the soldering tip before soldering each joint. This prevents accumulating solder on the tip and mixing in residues from previous soldering operations with the next one.

## RECOMMENDED ASSEMBLY SEQUENCE

It is recommended to assemble the kit in the following order:  
Be careful not to scratch the front panel while installing the parts.

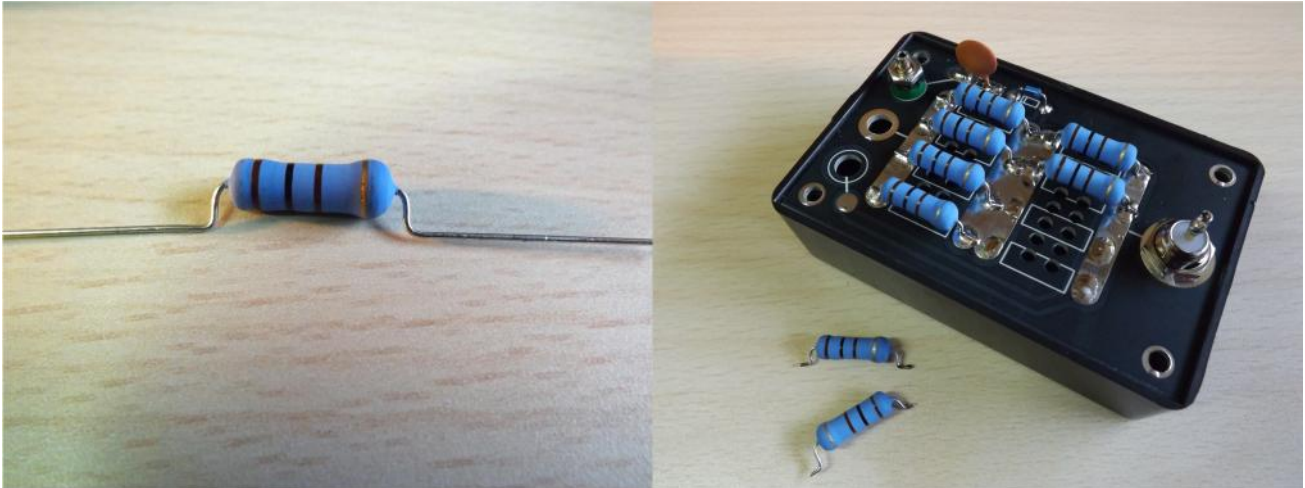
### INSTALLING COMPONENTS

- 1.- Place and solder the 8 resistors of value  $100\ \Omega$  3W. Bend the leads as shown in the photos. The resistors should be placed with a separation of about 2-3mm from the board. Keep the left-over lead clippings to use them for making connections later.
- 2.- Place and solder the 1N5711 in its position and correct orientation as printed on the board. The circular band on the diode should be positioned towards the capacitor and the jacks. See the photos.
- 3.- Place and solder the 10nF capacitor (marked as 103) in its position as printed on the board.
- 4.- Position and strongly twist the BNC connector into place. The washer should be placed on the reverse side underneath the nut. Be careful not to scratch the front panel.
- 5.- Position and twist the the three 2mm jacks into place. The black one should go into the hole marked "GND" and those of the other colors may be placed according to your preference.



## CONNECTIONS

- 1.- Use a piece of leftover lead clipping from the resistors to connect the BNC jack to the appropriate point on the circuit board. See the photos.
- 2.- Using other pieces of leftover lead clippings from the resistors, connect the "RF", "+Vout" y "GND" jacks to their respective appropriate points on the circuit board. See the photos.



## USE OF THE DL-1A DUMMY LOAD

You can use the DL-1A dummy load to carry out adjustments and tests with your equipment when it is best not to use an antenna.

In addition to serving as a conventional dummy load, the DL-1A has two outputs provided by means of 2mm female jacks to which a multimeter or other instrument can be connected.

## "RF" output:

The "RF" output provides connection to the RF signal directly across the load. Here you can connect an oscilloscope, for example, or another similar instrument to analyze the transmitter's signal while it is connected to the dummy load.

## " +Vout" output:

This is the output of the detector composed of the Schottky diode and the 10nF capacitor. Here you can connect a voltmeter with which you can measure the power in W using the following formula:

$$\text{Power (W)} = (V+0.25)^2 / 25$$

Where V is the measured voltage and 0.25 is the voltage drop across the diode.

The square of the sum of voltage is divided by 25 because that is the impedance at the point of the load from which the signal is taken.

### IMPORTANT:

The measurements are very accurate if a voltmeter of good quality, of 20,000  $\Omega/V$  is used. Many current digital voltmeters have very high input impedance, and not all are the same, thus causing the power measurements to appear higher than they really are.

In order to correct this, you can put an 820K or 1M resistor in series between the DL-1A's "+Vout" jack and the circuit board (instead of using a piece of connecting wire).

In order to calibrate your DL-1A with the voltmeter that you will normally use, you can compare its measurement with that of a high-quality power meter.

If you have any questions about how to carry out these connections and/or adjustments, feel free to request technical assistance at [ea3gcy@gmail.com](mailto:ea3gcy@gmail.com)



## FRONT PANEL FINISH

The front panel of the DL-1A is also the printed circuit board to which the components are soldered. It would be a good idea to apply a protective varnish to the surface of the front panel. The paint on the board is not very durable; however, a suitable varnish will help to protect it for a long time (there are spray-on lacquers for this purpose).

# 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](mailto: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 component for the kit, 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 accidentally.

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](mailto:ea3gcy@gmail.com)

THANK YOU for building the DL-1A kit.

Enjoy QRP!

73 Javier Solans, EA3GCY

# SCHEMATIC

