

Variation on a Theme – a Different Way of Constructing the ‘Stef Niewiadomski Stabilized Power Supply’ for an Eddystone EC10 by Gerry O’Hara, G8GUH/VE7GUH

Introduction

In Part 2 of my two-part article on restoring an Eddystone EC10, I mentioned that not having a Type 924 mains power supply, I had been using a ‘wall wart’. This arrangement had been working ok, but I did not like the way this unregulated supply’s voltage varied between no-load and load conditions. Also, there was a constant faint background hum that I was starting to find rather annoying.

So I decided that I would build the stabilized power supply described in the excellent article by Stef Niewiadomski, published in the July 2007 issue of *RadioUser* (the article can be downloaded from the EUG web site). I intended to construct the supply per Stef’s article, on a simple aluminum plate cut to fit the set’s battery compartment (photos, above, right). As I was measuring things up, the ‘junk box’ 12-0-12v transformer I had in mind for the supply was too large to fit the battery compartment aperture and a smaller one from the local electronics store was going to cost me \$25. While I was having a rethink, it occurred to me that I could still use a ‘wall wart’ for the DC supply to the same stabilizer circuit as per Stef’s article. Then, as I was reading through Stef’s article again, I saw it notes that the (female) McMurdo connector needed to be ‘robbed’ off the



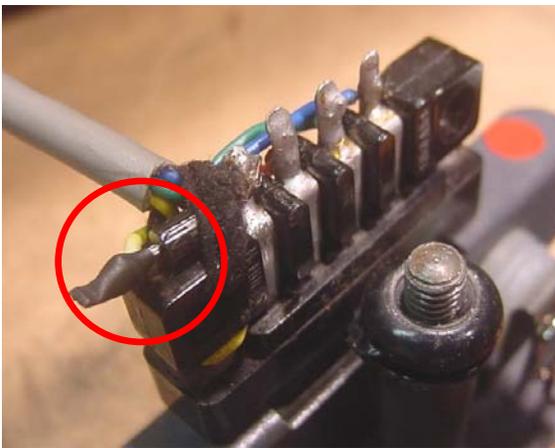
battery holder, or else another connector type would need to be fitted. This did not appeal to me much - then I thought 'why not build the supply inside the battery holder, thus preserving the original appearance of the set and without dismantling the holder?' I set about doing this with the intent of making the supply such that no modifications were needed to the battery holder or set whatsoever... interested? – then read on.

Design

The wall wart I had been using was a nominal 9 volt unit (actually over 12 volts under no load and about 9 volts when the set was running). I decided that I would need another wall wart that could deliver a higher voltage under load in order for the regulator chip to function correctly. I found a suitable one for a couple of bucks in a local thrift store (made by Panasonic – photo, right), rated at a nominal 12 volts at 500mA. I picked up a suitable in-line socket to mate with the wall wart's DC connector for another \$2 from a local electronics store – better than forking out \$25 for a transformer in my book...



Before I built anything 'in earnest' I simply tag-soldered the components for Stef's circuit together on the work bench – it worked very well. I tried out a few modifications to take into account parts available from my junk box, in particular using 2 x 3300uF 25vw smoothing capacitors, two surge-limiting resistors (one 3.9 ohm, the other 8.2 ohm), Mylar 0.1uF decoupling capacitors (not ceramic as specified in Stef's article) and a couple of extra diodes to prevent accidental reverse-polarity connections (I used rather over-specified type 1N4007s). One of these diodes was mounted on the circuit board to prevent damage to the unit if someone

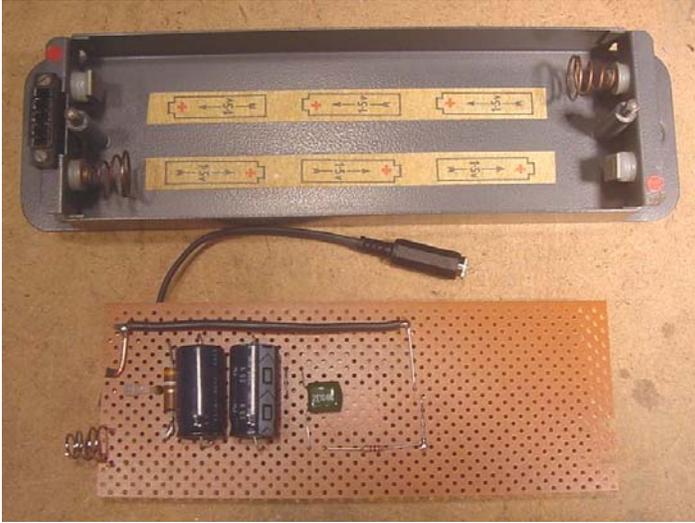


plugged a wrong-polarity wall wart into the set and the other was located on the (male) McMurdo connector as I always fear plugging this in the wrong-way around (diode circled red in photo, left).

With the final circuit configuration decided upon (see the annotated schematic on page 7), I now had to figure out how I was going to build something that would not require any drilling, gluing or soldering modifications to the stock battery holder.

Construction

I decided to use a piece of perforated Paxolin to construct the circuit on as this was to hand, could be shaped with ease and could be modified as I tried different arrangements of the components – also it cost me nothing and could easily be replaced. I would be the

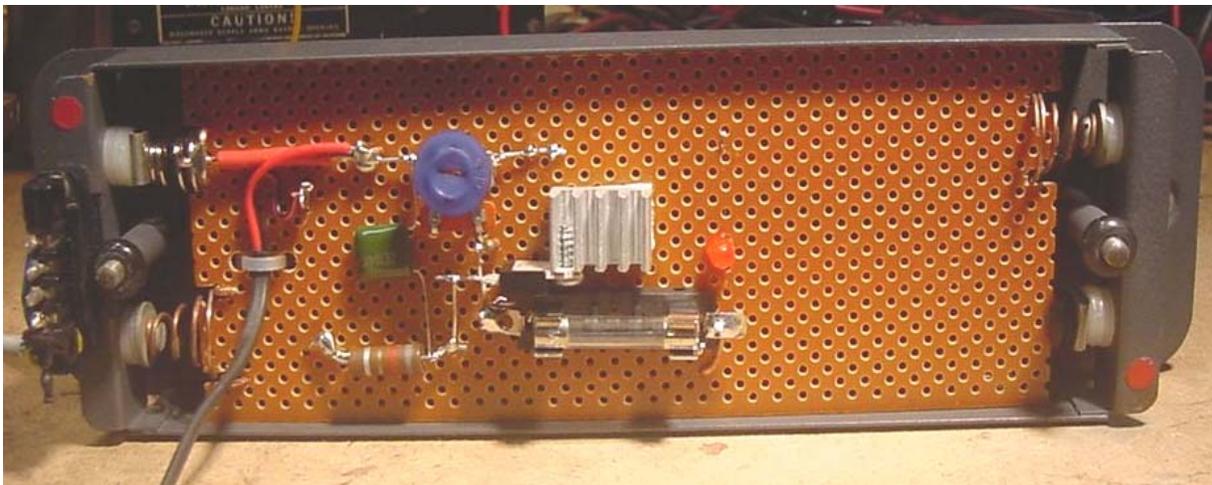


first to admit that the end result is a little 'hammy', but a professional-looking unit constructed along the same lines could be made using printed circuit techniques of course.

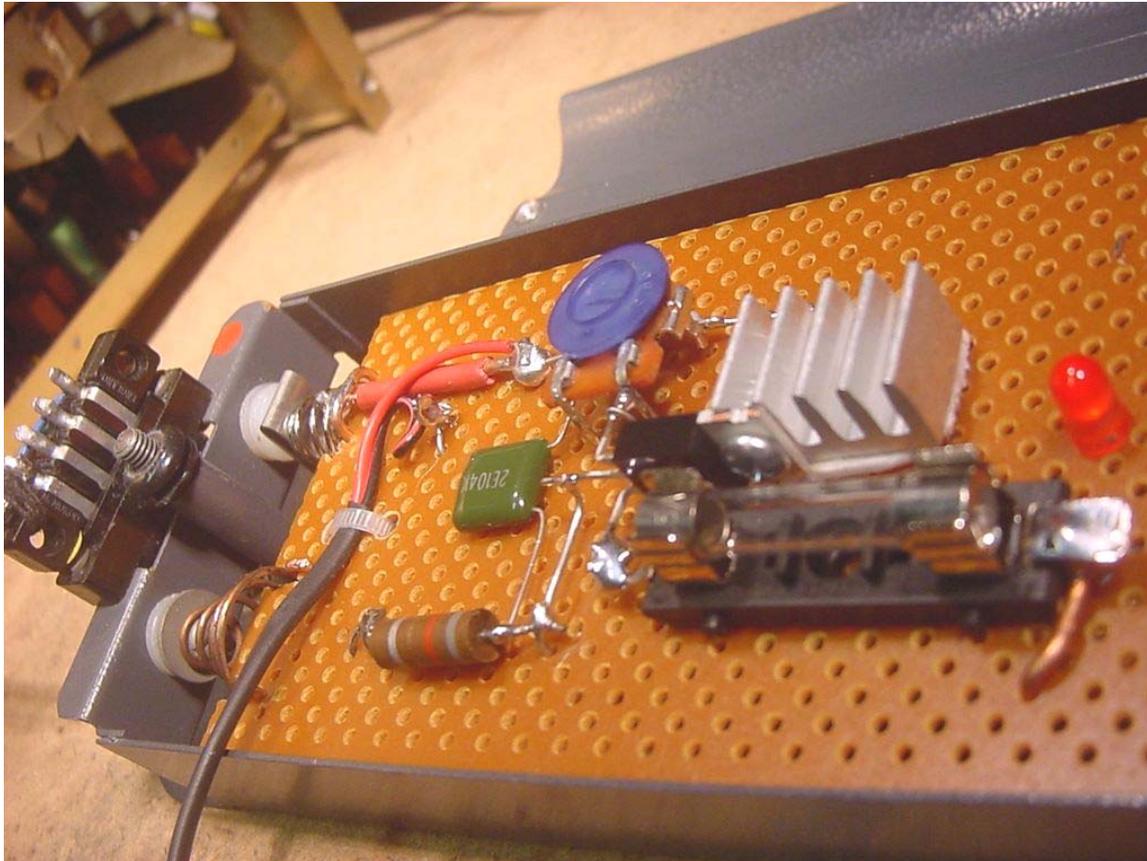
The key to the construction is the use of the existing battery contact springs (top in photo, left) to support the circuit board and to provide the required electrical connections from the board output to the receiver via the standard McMurdo connector

already installed for this purpose. The use of the wall wart as the unregulated DC input to the stabilization circuit reduces the dimensions and overall bulk of the circuit board significantly, such that it can be built inside the battery holder and the lid then fitted on to the holder as normal. The flying lead with the in-line DC connector for the wall wart can then be extended outside the case, held in place between the battery compartment and the rear of the receiver case when the battery holder thumbscrews are tightened – simple.

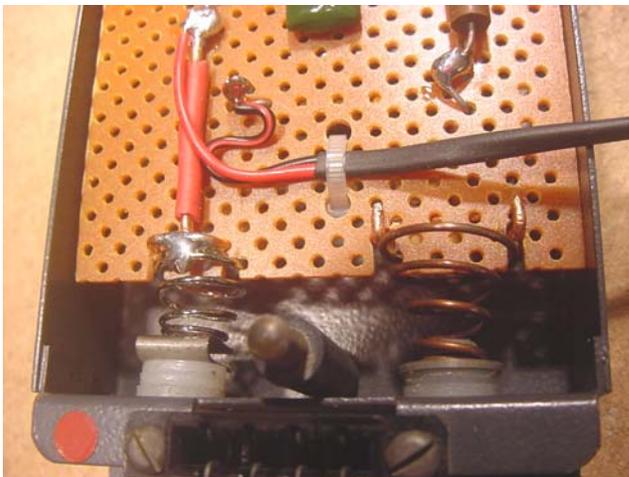
To allow the circuit board to be suspended inside the battery compartment, I carefully measured the length of Paxolin board needed, cut it to size by scoring with a knife/snapping, and then cut some small slots in the ends of the board such that the battery connection springs sat neatly in them with the board held midway in the compartment. As-is, this would not be very stable, so I decided to locate the two largish 3300uF 25wv smoothing capacitors beneath the board (bottom in photo, above) – their



diameter was just right as it happened so as to space the board from the base of the holder - the board now sits level and firm. The critical dimensions are the board length ($6\frac{5}{8}$ "), width ($2\frac{11}{16}$ "), and spacing/depth/width and location of the slots for the springs – these are best measured by inserting the cut-to-size board into the battery holder and marking it directly. The slots are $\frac{1}{4}$ " deep and $\frac{1}{16}$ " wide in my prototype unit (photo, above).

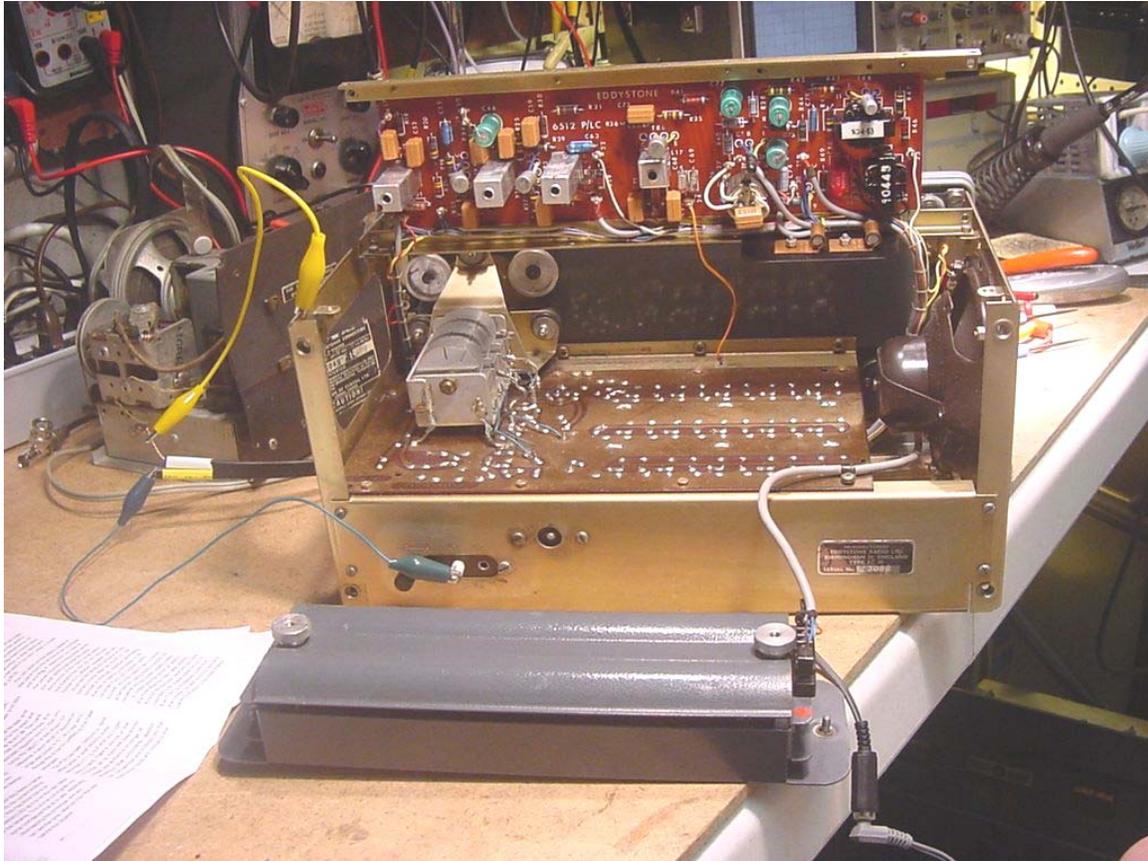


The components were mounted both above and below the perforated Paxolin board and arranged to avoid crossing wires. A small heatsink was screwed to the LM337T regulator chip, as I noticed during the bench lash-up that the chip became rather warm without a heatsink fitted when the set had been running for an hour or two. No insulation between the chip and the heat sink was used as the heatsink is not touching the chassis of the set. The heatsink is stuck to the circuit board with a double-sided sticky mount. Although the board is hidden from view when operating, I still included an LED across the output lines – just as a way of monitoring operation when testing the unit (photo, above).



To make the connection to the negative battery connector spring in the battery holder (to the right in photo, left), two thick copper wires were shaped to fit around the end of the appropriate slots. To make the positive connection, a suitable spring was located (in an old battery pack out of a scrap radio) and soldered into position (to the left in photo, left) such that it made good contact with the flat positive battery holder

connector. A rubber grommet was inserted between the positive battery connector on the opposite end of the battery holder and the circuit board to provide additional longitudinal stability of the board. The short flying lead with the in-line DC wall wart connector was then soldered into position, the board inserted into the battery holder and the lid fitted.



Testing and Operation

I plugged the wall wart into the DC connector and the unit worked first time (photo, above) – I found that I could vary the stabilized output voltage between 5 volts and 12 volts and draw over 400mA with less than 0.1 volts variation in output (the EC10 draws much less than 400mA – a maximum of around 200mA), whereas the Panasonic wall wart output voltage varied from 15.2 volts under no load conditions to 13.3 volts under load – confirming that the LM337T was doing a good job. I adjusted the board's output to 9.8 volts to account for the 0.6 volt drop across the silicon diode I installed as a precaution against accidental reversal of the McMurdo connector, this arrangement giving a healthy 9.2 volts to the EC10 circuitry. The LED glowed nicely and the heatsink hardly became lukewarm after using the set for hours.

I noticed that the clearance between the battery holder lid and the heatsink was only a few mm, so I placed a couple of small rubber grommets over the threaded pillars on the battery holder to provide a more comfortable spacing – this does not prevent the battery holder from being installed into the battery compartment of the set (one of these grommets is visible in the photo at the top of page 4).

Once assembled, apart from the little 'tail' poking out between the rear plate of the battery holder and the rear panel of the EC10's case (photo, below), you could not tell the set contained a stabilized power supply.



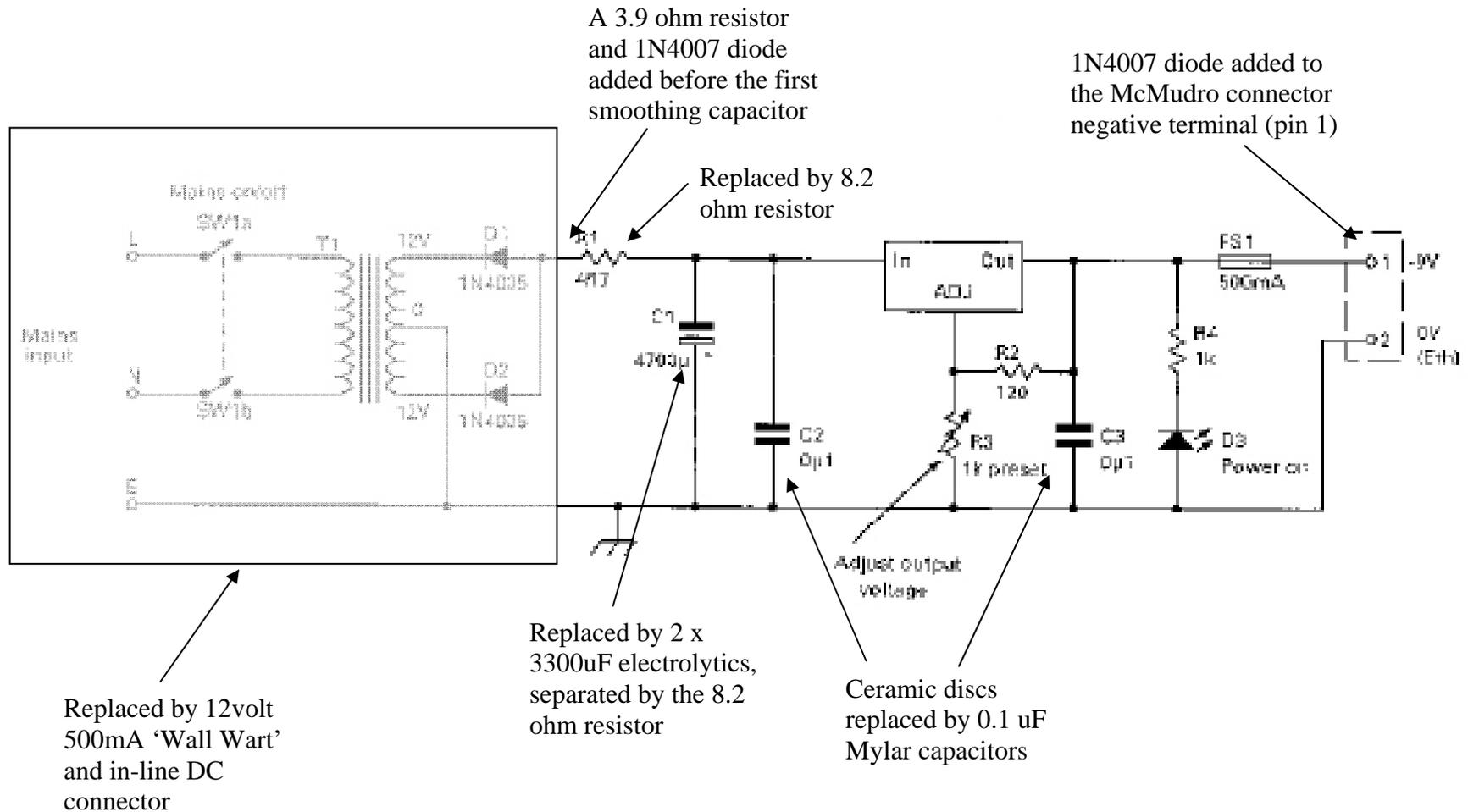
Conclusion

This method of installing a stabilized power supply into an EC10 (either MkI or MkII) is simple, quick and easy to make and install, is low cost, entails no modifications to the set or battery holder, can be quickly removed so that the battery holder can be used with batteries installed if desired at any time, and is completely reversible. It took me only an evening to make the supply from scratch almost entirely from junk box parts.

The Stef Niewiadomski circuit works a treat and is to be recommended: the only changes I made to the circuit were to suit the components I had on hand. The total cost to me was \$6, including the LM337T regulator chip. There is no trace of hum and the radio is rock-steady when the dial lights are operated.

73's

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Summary of minor modifications made to the original Stef Niewiadomski's circuit. These were made simply to accommodate ready-to-hand components and to provide protection to the stabilizer circuit and radio in the event of a reversed polarity connection being made inadvertently