Powering the Soviet R107 Transceiver.

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The Soviet R107 transceiver has been widely available for some time now, and comprises a hybrid transceiver covering 20 – 52MHz, FM, which is powered from two 2.4 volt 20Ah nickel cadmium accumulators. In this, the first article of a series, a simple way of powering the set from a 5 volt computer supply unit, is described, or the original type batteries can be used. Richard details the precautions needed with these, and Colin describes an easily constructed charger for them.

The R107 requires a 4.8 volt supply centre tapped to earth, which is provided by two 2.4 volt nicad batteries. The current consumption is substantially the same from both batteries so there is very little current flow in the centre tap so a single 5 volt supply can be used and a simple network of diodes and resistors used to 'phantom' the centre tap. The circuit shown below was found on the internet at www.kpjung.de, the website of DH4PY and is a simple and effective way of producing the necessary supply from the 5 volt output of a standard AT type computer power unit.

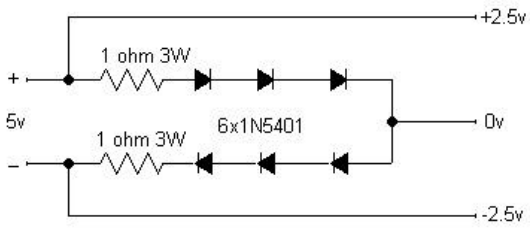
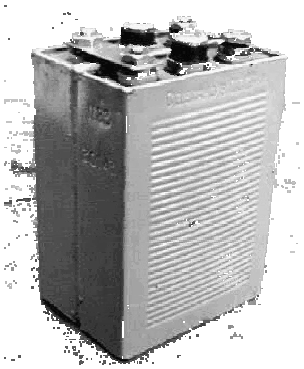


Fig. 1 Circuit used to derive a 'centre tap' from a 5 volt PC power unit.

Note that for most computer units to run it is necessary to have a load on the 12 volt output (the computer fans would normally represent this load) A 12V 2.2W lamp will do this admirably, and also serves to indicate that the power is on! If you were lucky enough to get a power plug with your radio this can be used, otherwise a connector can be fabricated, incorporating the diodes and resistors, using a piece of fibreglass PCB and some brass pins from the old style 15 amp mains plugs to fit into the battery clips (Fig. 4). It is important to make sure that the 5 volt supply is isolated from the mains earth. (Most standard PC supply units are, but do check!)

Using Nicad cells

The KNP20 Nicad accumulators required for the R107 are available from Armyradio (www.armyradio.co.uk) and are supplied without the electrolyte, which has to be sourced locally as it is prohibited from the post. The cells must therefore be filled before charging. The main electrolyte is a solution of Potassium Hydroxide in distilled (or de-ionised) water. Potassium hydroxide solution made up to the correct strength will suffice but the original electrolyte also contained a small amount of Lithium Hydroxide. Potassium Hydroxide Is relatively easy to obtain and is cheap. Lithium Hydroxide is neither cheap nor easy to obtain. When making up the solutions remember that Potassium Hydroxide is very corrosive and poisonous. Wear rubber gloves (and safety glasses) and wash away all splashed material. Solutions should be made up as near as possible at 20 degrees Celsius. Accumulators Type KNP 20 (or 2 x KNP20) require electrolyte of density 1.16 g/ml. This may be obtained by dissolving 204 grammes of anhydrous Potassium Hydroxide in about 750 ml of water then making this up to a litre in volume with distilled water. If Lithium Hydroxide (solid) is available 20 grammes should be added to the solution before making up to a litre in volume. Remove the vent plug from the accumulator and add electrolyte to the top of the plates. On the first charging take the vent plug right out as the liquid may expand out of the casing or you may need to add more!



The KNP20 battery

Normal charging rate for these accumulators is given as 4 amps for 6 hours but first off I would tend to give lower amps for longer time!

NOTE: always free the vent plug when charging. A useful tip to avoid trouble is to place the accumulators being charged in an empty polyethylene ice cream container. Potassium Hydroxide electrolyte will shift more than the polish off a table if let loose! Whilst it is possible to charge the accumulators in the radio, this is definitely not recommended! It is far easier to replace the ice-cream container than to repair any damage caused to the radio by electrolyte leakage.

A simple charger

Like standard Nicads, the KNP20 require constant current charging, not constant voltage as do lead-acid batteries. This is easily achieved by using a power transistor as a constant current source. The circuit is shown in Fig.2 and will charge two batteries in series. I built up the charger from my junk box in a couple of hours, it is then just a matter of adjusting the potentiometer to give the required current as described above. The fan, which is a 12 volt ex-computer unit, is essential for safe running as the transistor can be dissipating over 20 watts in some situations. The charger was built in a proprietary aluminium case, the photos show the general idea but no precise constructional details are given as these will depend on the components to hand.

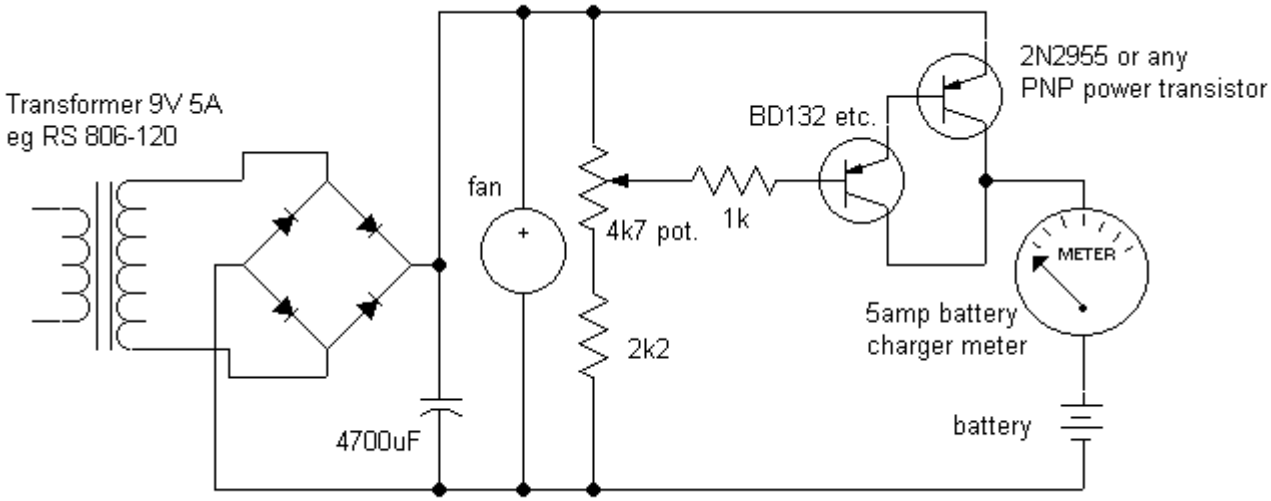


Fig. 2 A simple constant current charger.

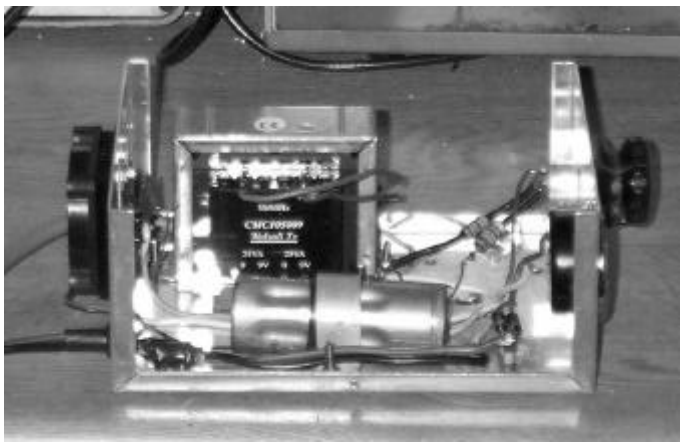
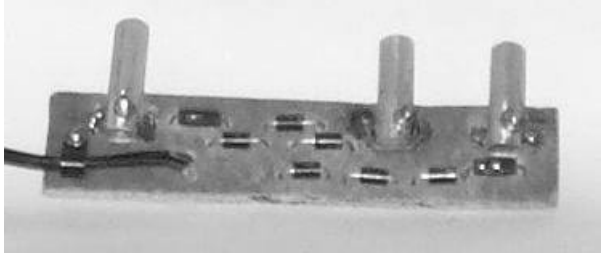


Fig. 3 (above) view of the charger showing the general construction.

Fig. 4 (below) homebrew power connector



Since using the charger I found that batteries left connected to it when it was switched off would slowly discharge. A 6 amp diode wired in series with the battery solved this problem.

A more detailed article by Richard Walker, covering the various types of Russian batteries may be found on the Armyradio website at www.armyradio.co.uk

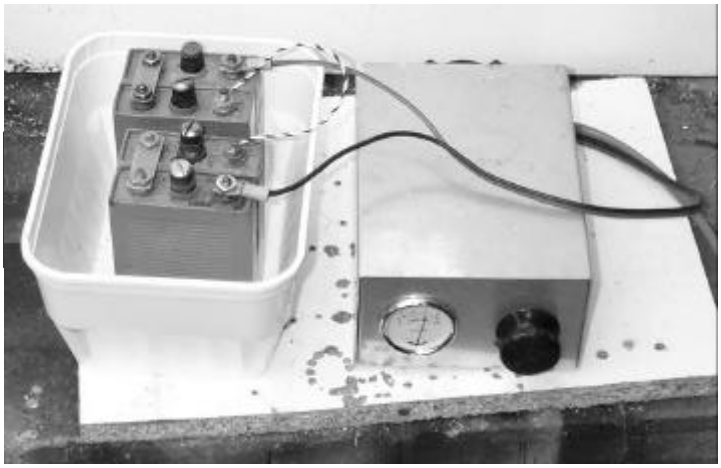


Fig.5 (above) Charging in progress!