Tocsin Bang

Modifying/Mending a Plessey PDRM 82

Introduction

Illustration 1: PDRM82 kit

There are a couple of issues with the PDRM 82. For its intended purpose its a great piece of kit, its tough and its simple.

Problem 1: Age This device was introduced in 1982. The GM-tube (ZP1302 or 1303) has a built in check-source. The ZP1302 used strontium-90 with a half-life of 27 years, later the ZP1303 was used with caesium-137 this has a half-life of 30years, and the tube is marked with a radiation trefoil. The source material is provided as a thin layer between the tin/lead compensating shield and the sensing chamber, and like all caesium and strontium compounds it is soluble in water. If the tube has got damp at any point then goodbye to the check source. Unless the Geiger tube has been replaced, the source is now beyond its intended life.

Illustration 2: The correct operational check

The purpose of the check source is to produce a low level count (a few counts per second). At switch on the counter test runs for ten seconds, and if too few counts occur then the test fails and you get the well-known flashing FAIL message, otherwise the reading will show 0.0. If you get the latter reading your counter is working, if not *nil desperandum.* Find a small screwdriver, switch the unit off. Now find the resistor attached to the pin of the tube. Switch the instrument on and rapidly tap the spring end of the resistor with the screwdriver about 10 - 20 times, make sure that you are touching the blade of the screwdriver, but not touching any other part of the circuit board or its components, now you should get a small reading, if so the counter is fine, if you don't then try another screwdriver. If you touch both the screwdriver blade and another part of the board you may well get a small electric shock, but more importantly you risk damaging the electronics. If you don't get a count the choice is to replace the tube with the original type (ridiculously expensive even if you can find one), give up,or modify.

Problem 2: Sensitivity The PDRM82 was designed for post nuclear attack use, and as such won't show a reading at all anywhere in the UK unless you threaten it with some serious levels of γ - radiation such as you won't be able to get your hands on unless you work in a professional laboratory. There is a simple solution, replace the tube with something far more sensitive.

The solution: A simple change to the tube is all that is necessary to solve problems 1 & 2. You will need to be able to solder, and to have the following:

1. A couple of lengths of flexible insulated wire (15cm should be enough).
2. A 4M7 resistor (1/8 or 1/4 watt)
3. Insulating tape
4. Sticky foam pads or a hot-glue gun.
4. A Geiger tube, any of the following will work:
   a) SBM-20
   b) SBM-20-1
   c) SBM-20U
   d) STS-5

It doesn't matter in the slightest which you use, but avoid other types they will give your problems. These are all Soviet tubes, and can be obtained off ebay for between £8 and £15. None of them has a check source, and the modification works because background radiation will do the job instead. Handle the tubes carefully, remember that the gases in the tube are at below atmospheric pressure and the tube walls are extremely thin, it is easy to crush the tube with very little finger pressure.

The modification is easily reversible, doesn't show externally, and results in an

instrument that is thousands of times more sensitive, it still won't show background but will give a reading with a suitable easily obtainable source.

Step 1:

Make sure the unit is off (preferably remove the batteries) and open the unit by removing the 4 crosshead screws.

Step 2:

Don't bother to remove the old tube, you may lose it or damage it.

Step 3:

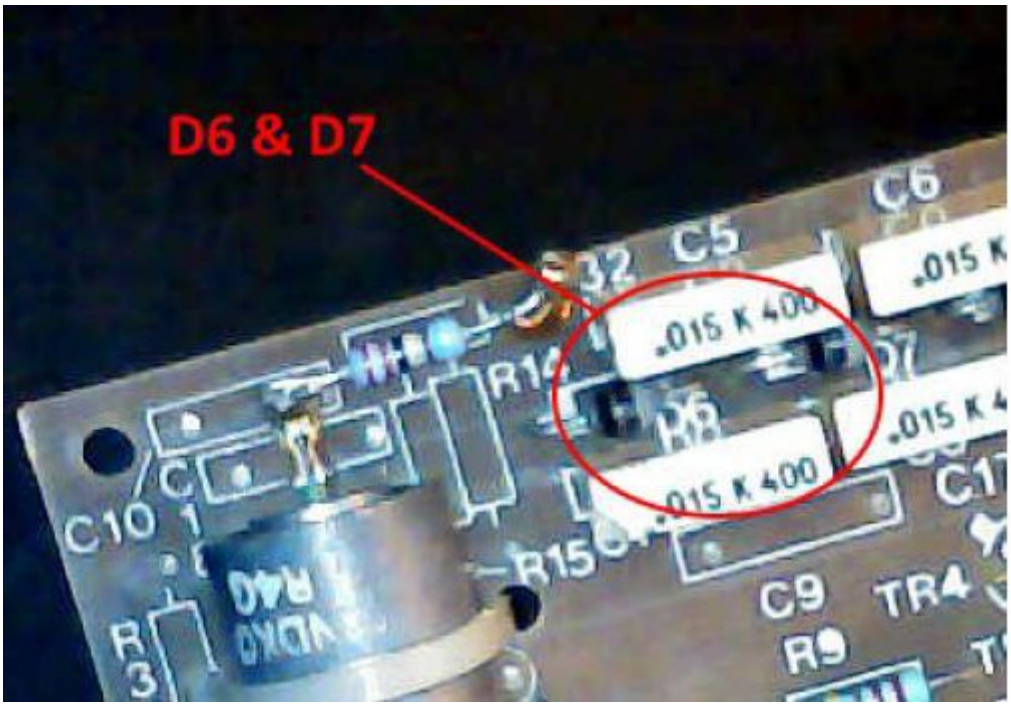

Illustration 3: Junction of D6 & D7

The above tubes all require a lower voltage than the original fortunately it is easy to find it by tapping along the voltage multiplier chain to the junction of D6 & D7.

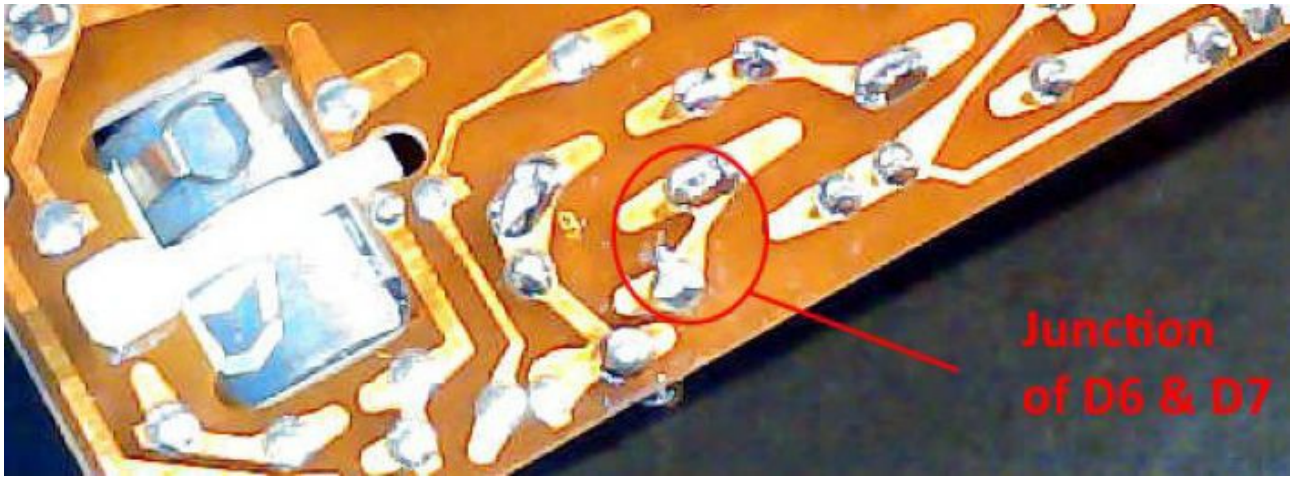

Illustration 4: Junction of D6 & 7 track side

Step 4:

Now turn the board over and identify the track where D6 & D7 connect.

Step 5:

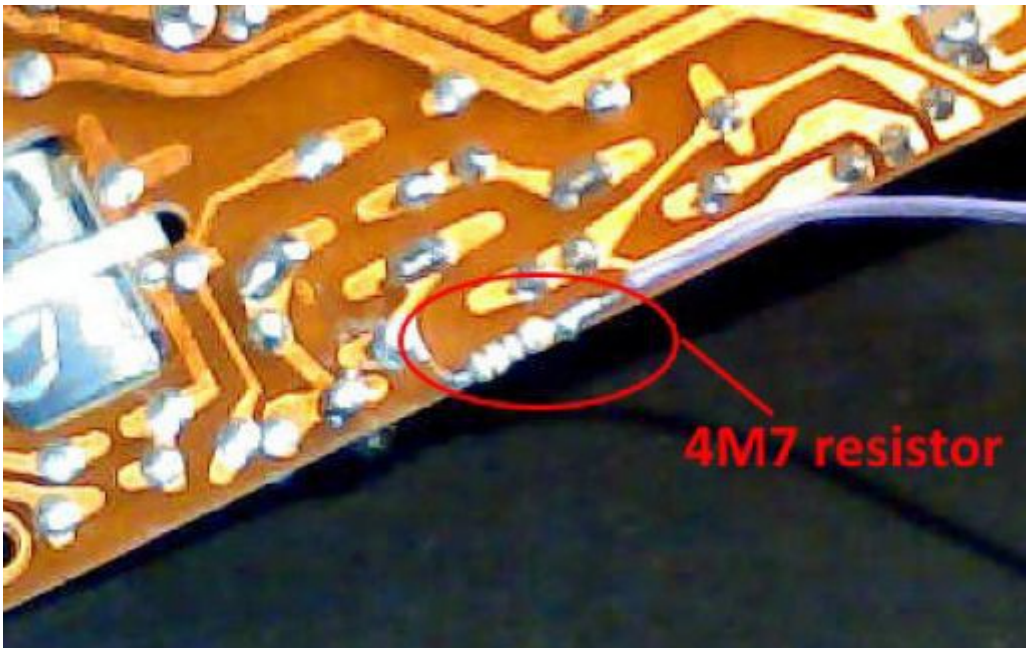

Illustration 5: Adding the 4M7 resistor

Trim the leads of the 4M7 resistor, bend one end through 90° and solder this end to the junction of D6 & D7 into place, solder one of the wires to the other end.

Step 6:

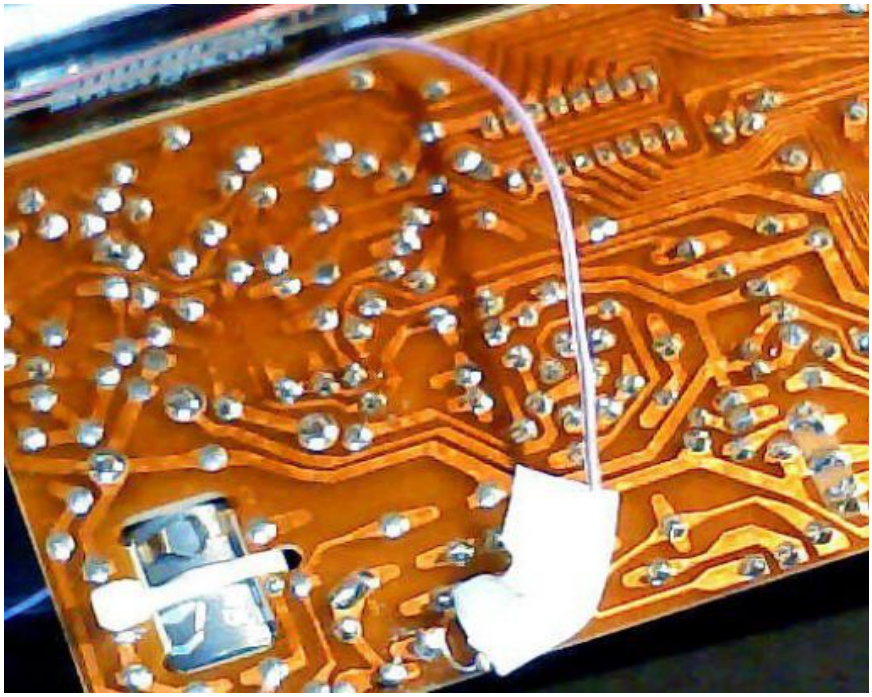

Illustration 6: Insulating the resistor

Now wrap the resistor in insulating tape and thread the end of the lead

between the battery tube and the circuit board. A spot of hot glue can be used to fix the resistor in place. The end of the lead will go to the anode (+) end of the tube.

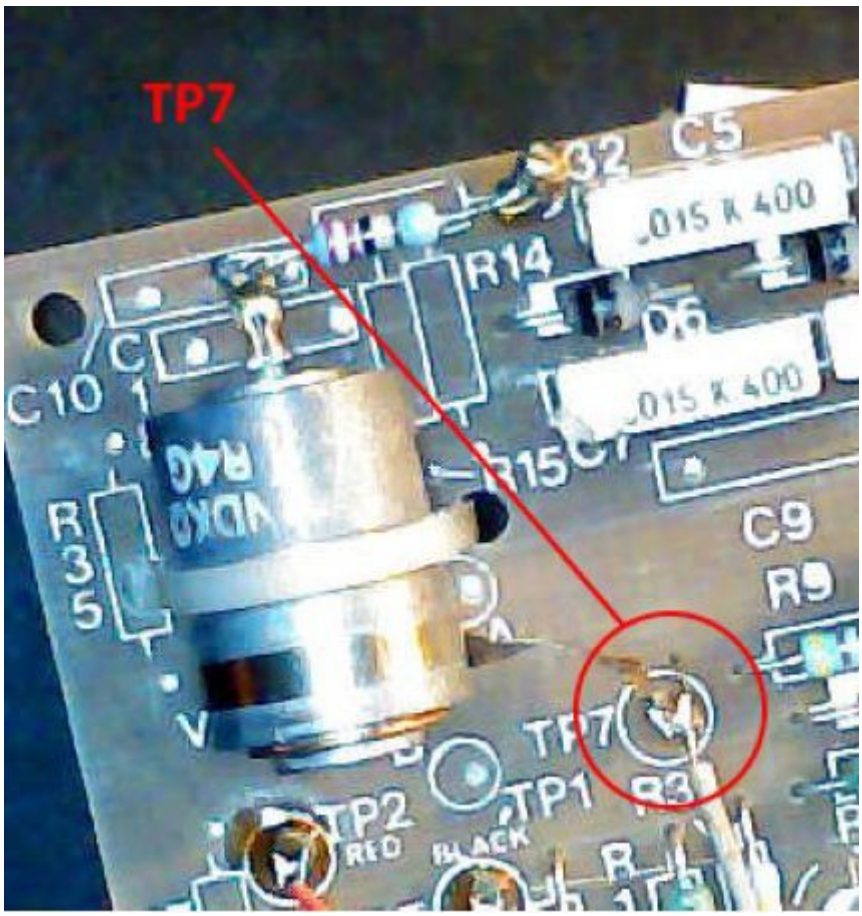

Illustration 7: Connecting to TP7

Step 7:

Turn the board over again, and solder your other lead to pin to TP7 this lead will go to the cathode of the GM tube.

Illustration 8: Connecting the tube.

Step 8:

Now strip about 4-5cms of insulation from the free end of each wire. Wrap the anode wire round the tube terminal marked +, and the cathode wire round the other end of the tube, make sure that there are no parts of the bare conductor that can make contact with the metal side of the tube. Do NOT solder these connections as heat may easily damage the tube.

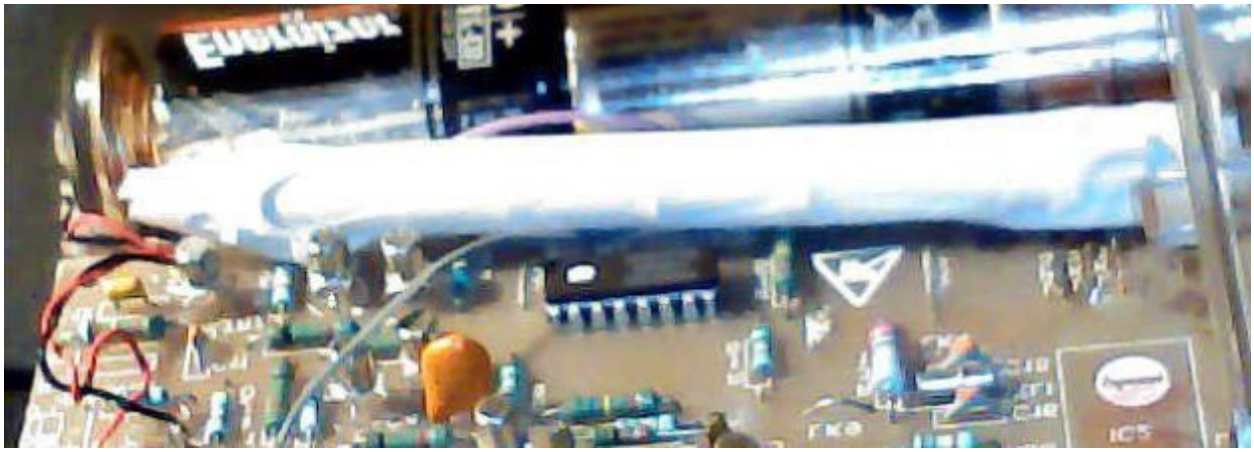

Illustration 9: Insulating the tube

Step 9:

Insulate the whole of the tube using tape (heatshrink is not a good idea as the tube is easy to crush).

Step 10:

Once insulated you can apply power and test your counter, remember that even though its a thousand times more sensitive than it was you won't get a count unless you expose the tube to significant radiation, however the unit should pass the self-test. The tube can now be fixed alongside the battery holder, take care with the positioning so that it isn't damaged when you close the case.

Note: some tubes may saturate at the levels required to give a large reading, this means that the range of modified units may be limited. This varies between individual tubes.
