At the Repair Bench – Heathkit® IM-5284 and IPA-5280-1 – October 2023

At this year's GCARC Hamfest, I picked up a pair of items for a very low price – a Heathkit® IM-5824 multimeter and a Heathkit® IPA-5280-1 power supply for the 5280-series test instruments. I never checked at all to determine the condition of these items – the price was right regardless the condition, and I was confident that I could repair anything that may have been wrong with the two items. It turns out that I was not wrong, but the challenge ended up being quite considerable.

Figure 1 - Heathkit® IM-5284 multimeter as refurbished

Figure 2 - Heathkit® IPA-5280-1 power supply

Let's talk about condition first. The power supply was plugged in to the multimeter and could not be unplugged. It turned out that the -9VDC wire in the connector body had overheated and melted the connection together, leaving cutting the wires as the only means of removing the power supply from the multimeter. More about the power supply later.

The multimeter was a mess. This unit has two front-panel wafer-type rotary switches and two front panel potentiometers. All four of these controls were seized and would not turn at all. On the rear panel of the enclosure is the connector to which the power supply cable connects, which we already discussed, and also a slide switch that is used to select between the power supply as a power source and the internal battery bank as the power source. This switch was also seized and would not slide at all. When I opened up the enclosure, I found more damage. While the two nine-volt battery snaps were unpopulated, they were none the less severely corroded, beyond saving. There was a leaking "C" cell in the holder for the ohmmeter power source. The alkali from this cell had leaked all over the inside of the enclosure, coating the bottom of the enclosure and soaking into the paint on the front panel. Several wires had corroded off their attachment points, and the battery contacts for the "C" cell were corroded beyond use, with one of them actually broken into two pieces and the other corroded so badly that there were holes through the metal.

I began by completely disassembling the unit and starting the clean-up of the various pieces. That was when I discovered that the alkali had damaged the front panel paint to the point where the paint all the way across the lower edge of the front panel washed off when I rinsed the panel under cold running water. I cleaned the enclosure sections with warm water and dish soap, removing all traces of the alkali and the corrosion. I cleaned the front panel the same way. Fortunately, the damage to the paint remained below the portion of the panel where there were markings for the various controls, so it turned out to be an easy fix with a rattle-can of the right color paint, first masking out the lettering on the panel to avoid overspray damage there.

The rotary wafer switches required complete disassembly in order to free up the moving parts and to clean the wafers properly. I did this for both of the switches, restoring them to working condition. Next, I disassembled the two front panel potentiometers and cleaned and lubricated them in the same manner. DeoxIT is the best choice for cleaning and lubricating these components.

The next thing that I tackled was the rear panel slide switch, removing the original one and installing a new replacement switch in its place. Then I set about repairing the damaged wiring, including replacing the two nine-volt battery snap connectors. Once all of the damaged wiring was repaired, I had to fabricate two new battery contacts for the “C” cell position. This was done by cutting some 24-gauge copper sheet metal to the correct size, and then making two cuts in the bottom edge of each new contact, reaching up about three-quarters of the way to the top of each contact. The center strip, between the cuts, was bent forward to form a spring contact that projects forward from the plane of the contact. I soldered the contacts to their wire leads, and then slid them down into their proper locations in the “C” cell battery compartment.

Once the multimeter was fully assembled, I went through the calibration steps as detailed in the factory manual for this unit, successfully calibrating the multimeter. To complete the job, I made up a set of probe leads for the multimeter and put them into the storage compartment built into the upper enclosure half. Job done… and now it was time to turn to the power supply.

When tested, the power supply was dead. I opened it up and found that the fuse was blown. Digging deeper, I discovered that one of the full-wave rectifier diodes was shorted as was one of the 500µF filter capacitors. I replaced the failed diode and all of the polarized capacitors in the unit – two of the 500µF capacitors and a pair of 10µF capacitors at the outputs of the voltage regulator IC’s. I then replaced the fuse and tested the unit. It came right up and operated correctly, so I placed it under a load to verify the voltage regulation. The unit held rock steady at +9VDC and -9VDC at the two outputs. I assembled the power supply enclosure and replaced the cut-off plug that was melted when connected to the multimeter, and the power supply was as good as new.

Ultimately, I listed the two units on ebay, and the multimeter sold within two days at my full asking price. The power supply, as of this writing, is still available there.

It may seem like a reckless thing to do, to purchase some equipment on a whim without knowing anything about the condition of the equipment. It may actually be foolish. However, as I said earlier, I didn’t care what condition the items were in, as I was confident that I could restore them, and I did. Not only did I restore both items, I sold one of the two for considerably more than I paid for both of them together, and when the second item sells, as it will (it is a very rare piece of equipment), I will be that much further ahead. When you are sure of your abilities, and when you have the skills to overcome most problems, you can go out on a limb and take chances like this one was. And, when you are not so sure of your skills and abilities, there is no better way to learn and to build those skills than by trying.