

Icom 746 Pro Sudden Death Club Fix

A good friend asked me to look at his Icom IC-746PRO which suddenly stopped transmitting. I didn't know where to begin until I found a WEALTH of information on the Internet about other hams who have experienced the same fate!

Here is a particularly good article detailing how THEY fixed the radio
<http://www.qsl.net/k5lxp/projects/74...46ProNoTX.html>

Many more hams across the world have found the same thing. IC-151 is BLOWN! It is a uPC1678G, an obscure IC not made since around 1999, and Icom must have cornered the market on them, as none are to be found elsewhere.

WHY is IC-151 blowing? And why so often.

The radio I opened had the IC changed once before, so this is the 2nd time this particular radio blew the IC.

Some of the Internet reviewers speculate HEAT, and have fashioned fancy heat sinks on the chip. This was all very Perplexing, as the IC cost \$22 from Icom. SURE don't want to blow any more of them!!!!

I showed the problem to the Master Engineer here at the plant, an RF Specialist who designs Microwave transmitters. HF is a SNAP for him. He noticed the IC only draws 30mA and puts out 150mW. Not much for this chip, so the Heating issue is BOGUS!!!! Not being blown by input transients either, with all the protection diodes and such. WHY are these blowing and so frequently????

He recalled the time a junior Engineer here was working on a circuit using a RF2126, a 1W 2.4Ghz IC. The Guy had blown TWELVE of them in a row trying to get the circuit to work. After considerable HAIR TEARING, they found out the guy was using a 5.1uH choke going to the Collector of the device instead of the required 5.1 NANOHENRY!!! Turning on the supply up to 5V was causing a massive INDUCTIVE SPIKE and blowing the Collector out of the chip!!! Replacing it with the correct 5.1nH coil did the trick!

So as he looked at the circuit, he found the SAME THING!!! Icom used a 22uH RF Choke for L152, going right to the IC's collector output. Turn on the supply and ZAP!!!! An inductive spike will be present on the chip, and after enough zaps, the IC is BLOWN!!!!!!!!!!!!

He suggested putting a big cap on the input to the circuit, so that the 5V supply comes up slowly.

It was time to get to work on the 746PRO.



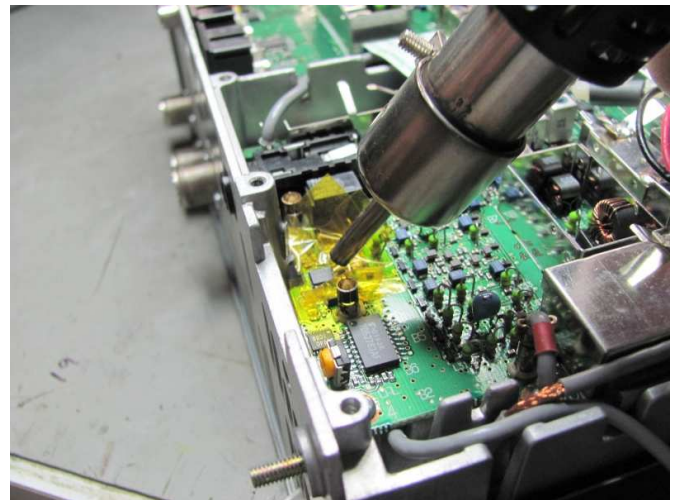
When I opened the radio, I found a big HEATSINK on IC-151. However, they forgot to add Heat sink compound and the Heat sink was not TOUCHING the IC!! A lot of good that did!! I removed the heat sink.



It was time to remove the IC, but we don't want to bother the other delicate components around the chip, so they are masked off with KAPTON TAPE. This deflects the heat and only the IC will be heated.

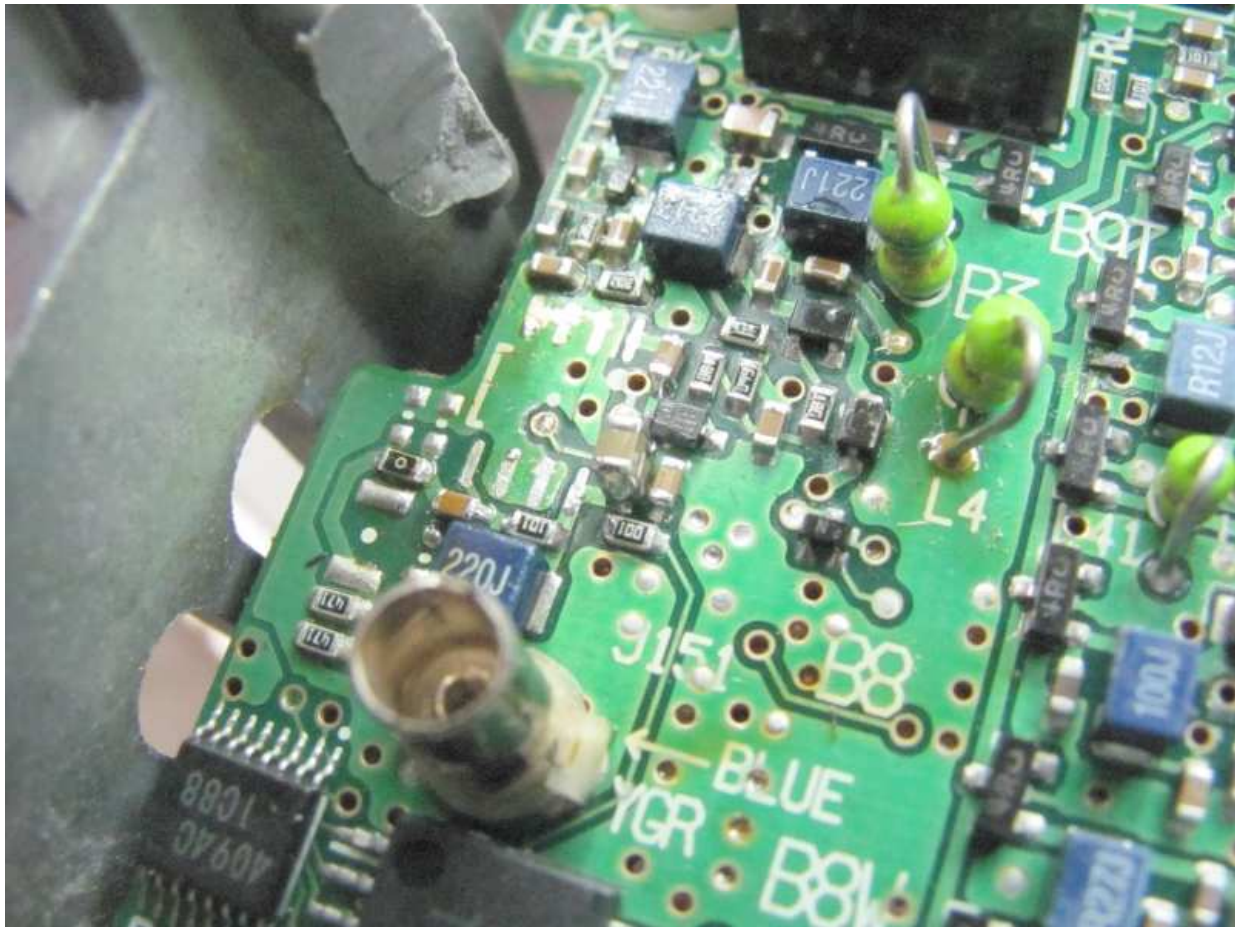
The device to remove the IC without endangering the pads is a hot air machine. It directs a pinpoint stream of heated air at the IC pins and melts the solder

Here we are heating the IC. It only took a few seconds before I could flick off the IC from the pads, leaving none damaged. The remaining solder was wicked off.



Note: I removed the IC using only solder wick and it worked fine without all the tape mess and extra heat - [WA3WSJ](#). I also removed the 10-ohm resistor on the Vcc to the IC and installed it on end to the IC Vcc pin. I then inserted a 2.7v zener diode in series with the resistor and feed it with a jumper to the transmit 8vdc line. IC 151 now only has voltage on it during transmit time.

Now that the IC was off, the PCB was removed so I could install a couple of protection diodes on the back side. Then, on the top side, I installed 2 10uF caps where C156 was giving me 20uF of capacitance. You can see them just to the right of the IC pads.





The IC arrived from Icom by Saturday FEDEX delivery, and I was ready to install it. It was soldered in and all voltages tested.

With my O-Scope, I monitored pin 8 and 5 of the IC. I turned the power on and off and saw NO SPIKES now. It was time to test the radio



To my great delight, the radio put out full output! IT was FIXED!!! I tested the radio with my finger on the IC to see if there was any warming. NONE WHATSOEVER, so the heat sink was NOT installed. All the articles saying to add the heat sink are a waste of time. The IC does NOT get hot!!! It gets ZAPPED and that is why they are blowing!!!

So, in conclusion, all Icom owners of 746Pros are running on BORROWED TIME. It is not a matter of IF your IC-151 will blow, but a matter of WHEN. I suggest installing the C-156 mod of 2 10uF 603 or 805 sized caps in place of the existing 4700 pF! Now your 746PRO can run forever with NO DANGER to IC-151.

Icom really ought to RECALL all the units to make this repair, but don't plan on it.

My friend will be delighted to get his WORKING IC-746PRO back. Wish I had a nice radio like this!

EVERY Ham should know how to properly Solder!