

MARS Modification  
For  
Yaesu FT-897D

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## Introduction

I've created this document to clear up some confusion regarding the expanded transmit frequency modifications (aka MARS/CAP or "freeband" mod) for the late model Yaesu FT-897D HF/VHF/UHF transceiver. I purchased this radio in late May of 2008 here in the US. The radio is of type A2 (you can find the type of your radio on the original box).

I researched the modification online for a while and determined that everyone seemed to have a different set of instructions. Given that today's radios are not cheap pieces of hardware, I was a bit nervous about the project.

After comparing notes with several different sets of instructions, I came up with my own. Let me also say that I've never soldered on surface mount circuit boards. I am a software developer by day, and extremely dangerous with a soldering iron... ha ha.

In this document, I'll show before and after pictures of my particular radio as it came from the factory, and then the final product of the modification. I'll also share some hints & tips along the way of soldering techniques that worked for me. Don't let me kid you... I've been soldering since I was 11yrs old, but never before on small compact electronics. I was a bit intimidated. I'll share my strategy for overcoming this.

Unfortunately, this MARS mod also means you will lose a bit of functionality from your rig. There are three main drawbacks, which I haven't found a workaround for, and other folks seem to be experiencing the same issues.

1. As you push the "band" buttons on the front panel, the 60m band will not be a preset destination along the way. Don't fear, you can still operate 60m just fine. All this means is that you have to land on 80m and scroll up in frequency, or 40m and scroll down in frequency. Not many folks actively use 60m, although the critical frequency of NVIS setups does travel through this frequency band quite often. This isn't a huge deal, just program your memories to the usual five ham channels if you're really going to miss them that much.
2. This one is the real pain. I use my FT-897D as a full time HF and VHF rig. I also have another (older) HF rig, but this 897 is my primary piece of equipment at the moment. As you are probably well aware, the 897 has a built-in awareness of the standard FM repeater shifts and whether or not they are a + or - shift depending on where you are located in the 2m or 70cm bands. This is called ARS (Automatic Repeater Shift - menus 2 and 3). Unfortunately, this will become disabled after this mod is complete. Luckily the memory can store the offset, +/-, DCS codes, etc which makes this mostly a moot point, unless this is a mobile rig and you travel often with it. This leads me to the third drawback of this mod...
3. This mod involves a reset of the radio, which means you will lose all of your memory settings and menu adjustments. Do your best to jot this information down someplace where you can re-enter it later. Apparently there are some pieces of software that do this task automagically, but I've never used it. This is a new rig to me, so I've luckily not programmed its memory channels yet.

## Getting Started

First thing's first, you need a good fine-tip soldering iron. A 30 watt pencil-iron will do. Personally, I have a variable temperature Weller pencil-iron that ranges from 350-850 degrees Fahrenheit. I had the iron set on 700 degrees for this particular project.

If you follow my soldering technique, you'll need some very small diameter copper wire. I happened to have some extra CAT-6 cable lying around (leftovers from a recent house wiring project) which worked perfectly for the task, when I separated out the individual strands. You won't need much of it, so don't go overboard.

## Observe the Lay of the Land

Since you're reading this document, you're probably a bit on the cautious side – just hoping not to screw up your new beloved rig and face the humiliation of sending it back to the factory for repair.

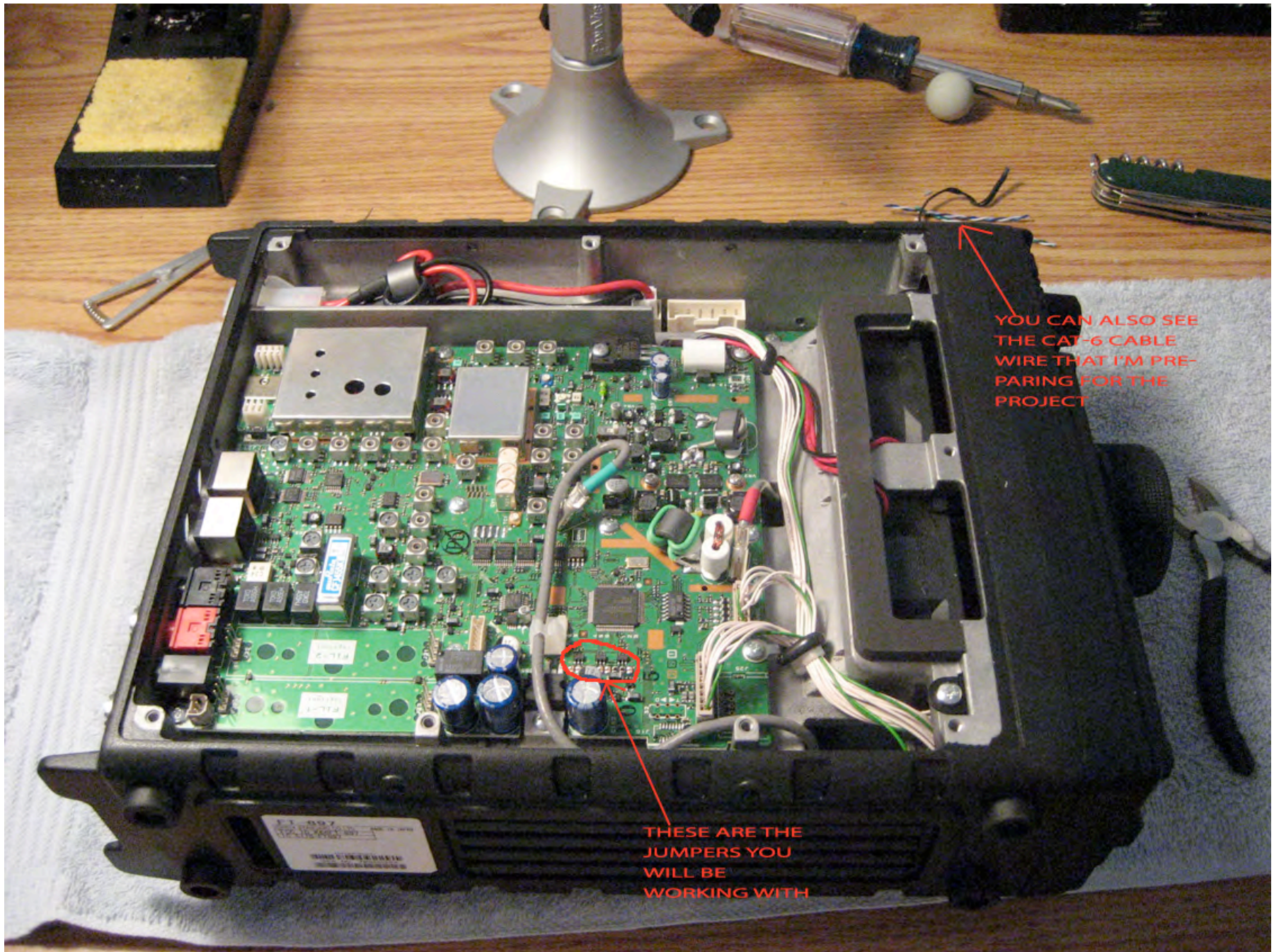
Here comes the disclaimer. I can only verify that this mod works on this particular version of the FT-897D. This is the typical, “your mileage may vary” statement, and I assume no responsibility or liability for any damage caused to your equipment. Proceed at your own risk.

My particular radio had the following label on the original box.



The next step is to unscrew the top cover and locate the jumpers you will be working with. Removing the top cover is generally pretty straightforward, so I won't go into much detail here. The only thing to be cautious of is the cable for the battery switch and the internal speaker. Both have a molex connector that you can easily disconnect. Once you've removed the top cover, set it aside.

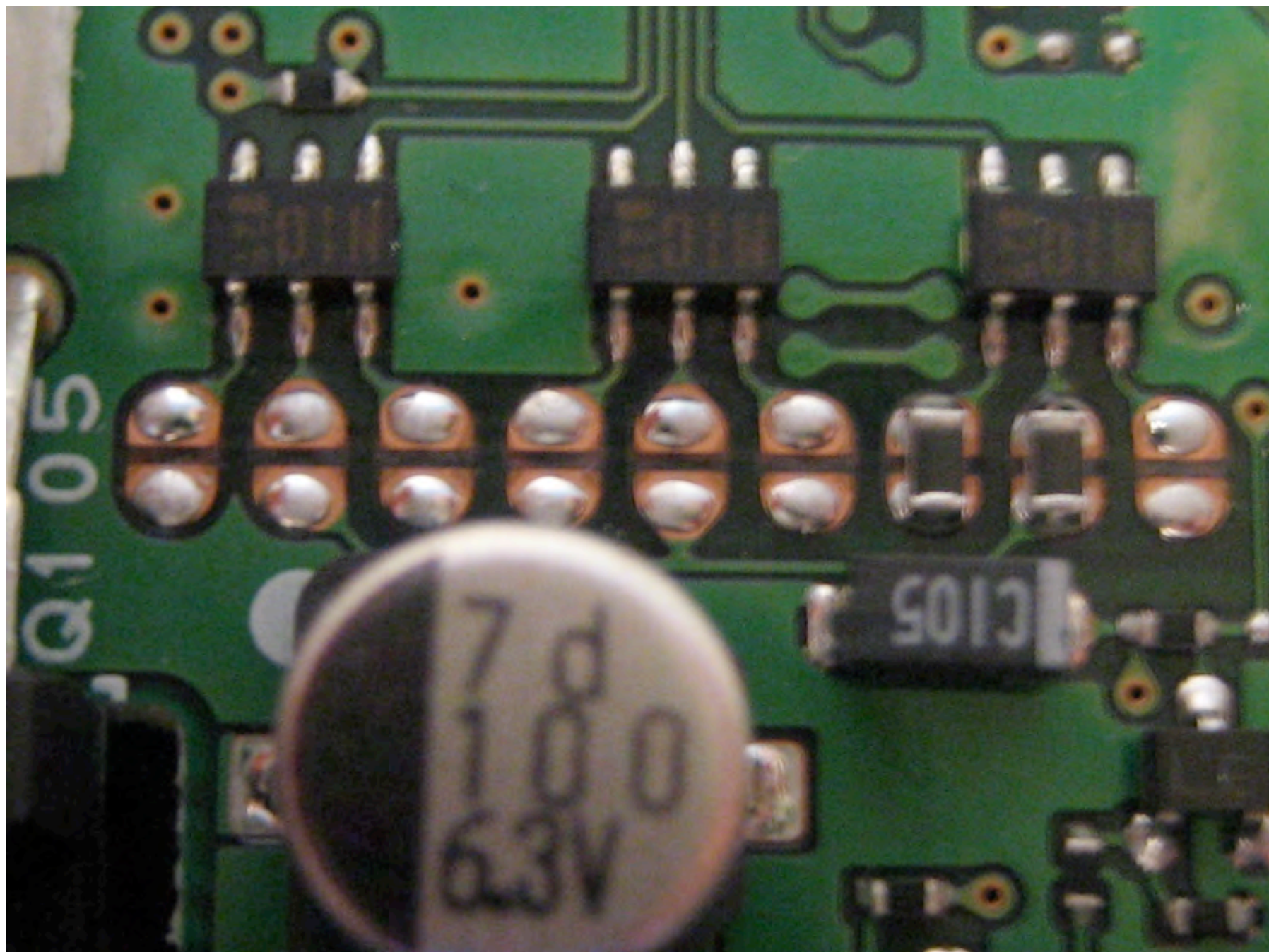
Here's a picture of the top of my rig, as it sits on my workbench. In all the pictures, the orientation of the rig is always the same. The VFO knob is always to the right, in every picture.



THESE ARE THE  
JUMPERS YOU  
WILL BE  
WORKING WITH

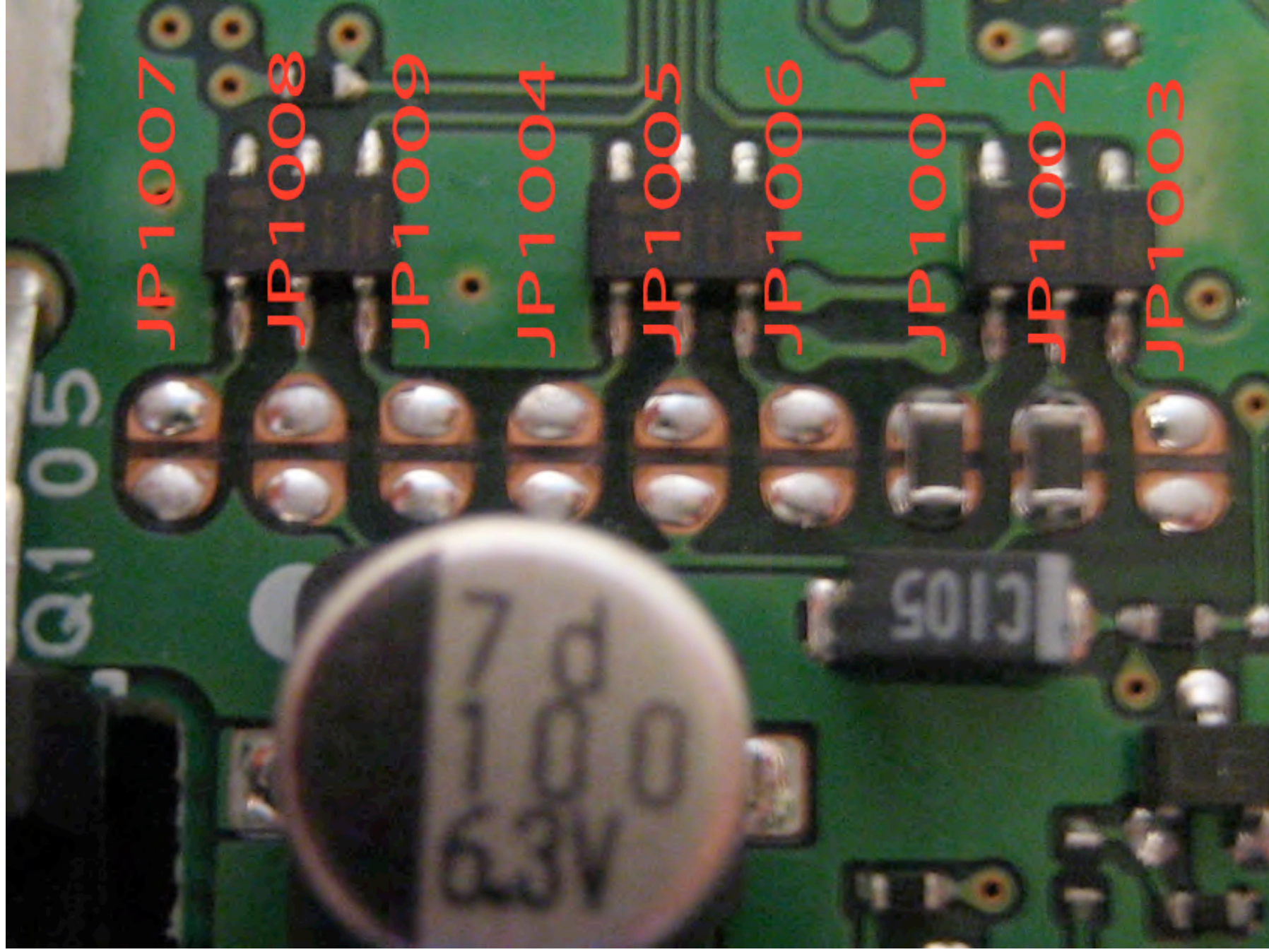
YOU CAN ALSO SEE  
THE CAT-6 CABLE  
WIRE THAT I'M PRE-  
PARING FOR THE  
PROJECT

Here is a close-up of the jumpers, with the rig in the same orientation on my workbench.



One interesting thing to note about the FT-897D is that the numbers for the jumpers do not proceed in numerical order. This was the most stressful part of the endeavor, as every set of instructions I came across used some different numbering scheme. Let's be crystal clear from here forward.





JP1007

JP1008

JP1009

JP1004

JP1005

JP1006

JP1001

JP1002

JP1003

Q105

7  
100  
63V

C105

As you can see, my radio came from the factory with jumpers 1001 and 1002 bridged. Up until now you may have seen some charts<sup>1</sup> that supposedly tell you what jumpers are bridged by the factory, depending on the type (A2 in my case) of your radio. According to these charts, 1006 was supposed to already be bridged, but it wasn't. This created some confusion for me. Needless to say, the pictures tell the story. Let's continue...

## Perfect and Practice the Technique

By now, you are probably thinking to yourself, "oh man... this is some intricate work!". Indeed you are correct. This is **not** a task to perform after consuming a pot of coffee when your hands are all jittery and you can't sit still. It's best you do this when your patience is at its max.

Recognizing that the skill this required was beyond anything I'd done before, I rummaged through my closet of old electronics (we all have one, don't we?) to find some old PS/2 mouse that hasn't seen the light of day in about a decade. After pulling it apart, there were lots of solder points on the underside of the board that would serve as good practice for me.

I didn't want to just fill the gap between the jumpers with solder, because I feared that I might get the settings wrong and have a heck of a time trying to clean up after myself. My **DE**-soldering techniques leave a little bit to be desired.

After trying several different approaches, I settled on one technique that seemed to work consistently for me. It works like this...

1. Strip a single strand of CAT-6 wire (something similar to AWG 18 might be close in size) to the bare copper.
2. "Tin" the entire strand. Basically this entails just coating the entire piece of copper in a thin layer of solder.
3. Cut the finished product into about 2mm chunks. Yes, I said 2 mm. Switch to decaf.
4. Using a pair of tweezers bridge the gap between to pads with your tinned "bridge" (there's a picture below if you need a visual). This requires a lot of patience. Don't rush this part.
5. With a steady hand, touch the needle point soldering iron to the middle of your "bridge" which should easily heat the 2mm of copper and fuse the solder at both ends.
6. That's it.

It's not the prettiest thing in the world, as you'll see in my pictures below, but it works – and you get the satisfaction of doing it yourself.

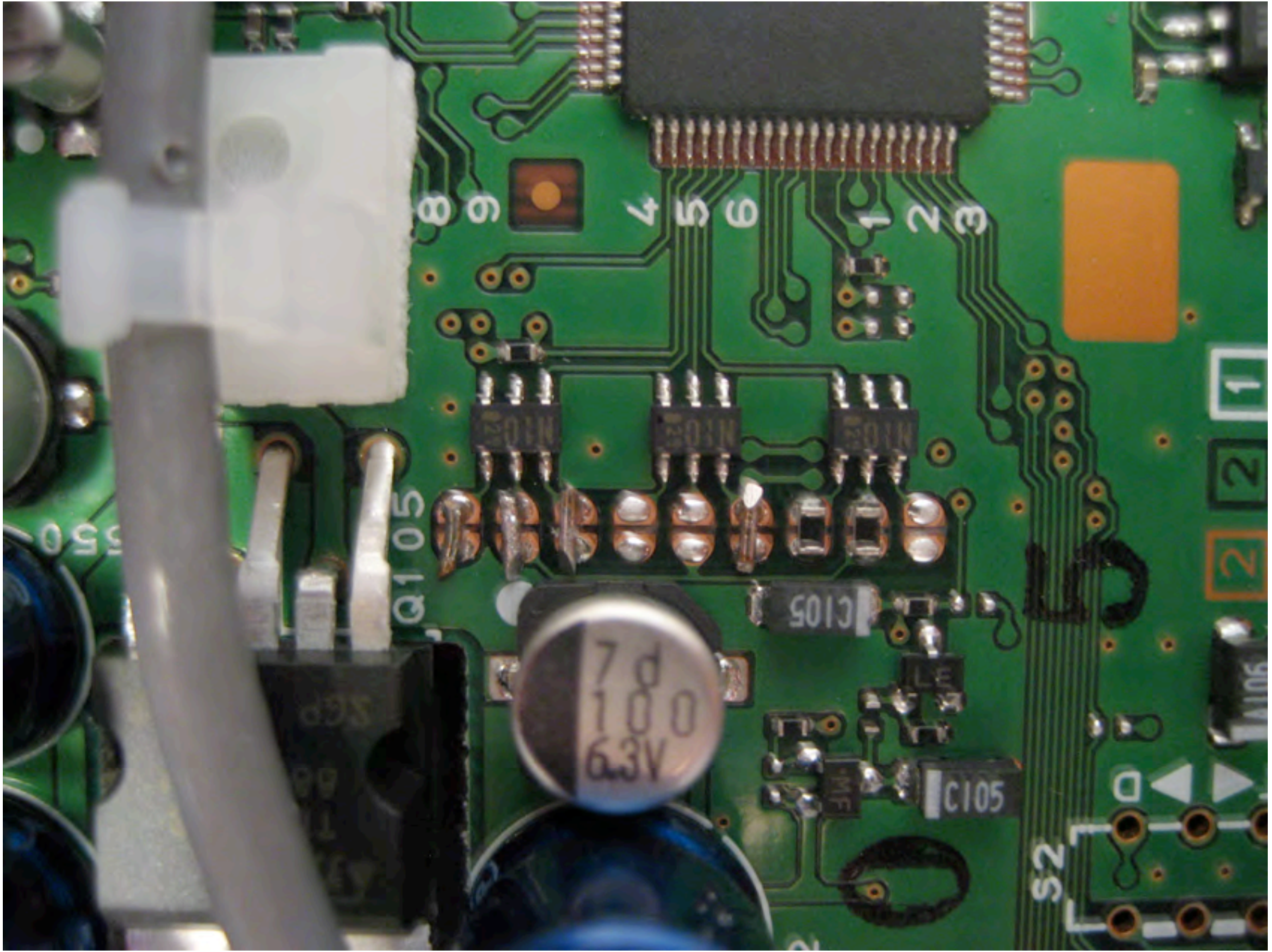
## Get it Done

Now that you know *where* you are working and *how* you are going to approach it, here's what you need to do. Jumpers 1006, 1007, 1008 and 1009 need to be bridged (in addition to 1001 and 1002, which are already bridged).

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<sup>1</sup> [http://www.mods.dk/mod/\\_1/3680\\_ft-857\\_Jumpers.jpg](http://www.mods.dk/mod/_1/3680_ft-857_Jumpers.jpg)

The finished product looks a bit like this (I told you it wasn't pretty):



The best part is that, should you screw up, just grab a pair of tweezers and put them on each end of the copper bridges, touch your iron to the middle of the bridge and just lift up.

The final step is to put everything back together and start up the radio. Hold down the “V/M” and the “F” key on the front of the radio as you push the power button to turn on the radio. This will generate a series of beeps indicating that the radio has been reset. With any luck, you should now be able to operate on non ham-band frequencies.

## **Conclusion**

Obviously this is an amateur job. But then again, we’re “amateurs” aren’t we? Take pride in your knowledge, tinkering, experimentation and be sure to share the results. I’d appreciate knowing if this how-to helped you, and if I forgot to include any crucial detail. Please let me know how this worked out for you.

Stay tuned... this is the first of many how-to’s from my desk. The next will feature my home-brew, budget-oriented MARS NVIS that will help you get on the air in no time. It is a 160-10m long wire that you can tune to any frequency your heart desires.

Most importantly, I hope this gets you on the MARS frequencies quicker, so that we may serve our country when it needs us most.