

The bane of FM-SSTV: an editorial

This site exists to promote SSTV on VHF and other non-traditional bands and modes. I would not be able to forgive myself if I did not write this article at this time.

There is a problem that appears to be unique to FM-SSTV. I have never seen anything written about it.

The bane of FM'ers has it's basis in more traditional problems so let me start with them.

Modern SSTV is relatively convenient. Connect your radio to your PC and you're in business. Well, sort of. There are several "gots-yas" that are waiting to bite you in the behind.

- ✓ The receive line should be isolated to prevent AC hum and ground loops, not to mention a very real danger of electrocution.
- ✓ The transmit line should be conditioned the same way, and also needs to be designed so that the PC sound card output does not over drive the microphone input to the radio.
- ✓ You also need some way to put the radio into transmit mode when you are ready to send a picture. This can be as simple as using the mic PTT, or can be an elaborate scheme involving relays, optocouplers and the like. There are hum and ground loop possibilities here too.

Many users simply buy an interface made for that purpose. Others home-brew their own. Which ever way you choose, you still end up connecting your rig to your PC. The manufacturers of these boxes do not have a standard for interfacing PC to radios. Indeed, the rig makers can't even settle on one style of microphone plug. So, even if you buy an interface you may still have cabling problems.

There are several ways around the cabling problems. [MFJ](#) , [Tigertronics](#) and [West Mountain Radio \(RIGblaster\)](#) use a jumper block to re-wire the connectors to fit the purpose. [DONNER's](#) and [BUX CommCO](#) the maker of [RASCAL](#) (Radio And Sound Card Adapter Link) use a different technique. They simply have a different model for each type of wired connection. Either way it is helpful if you have a pin-out of you radio's microphone jack (and/or the accessory jacks).

Before I go on I need to get this off my chest: Be careful. Some of these manufacturers do NOT design for SSTV. They design for PSK-31 and other digital modes. The difference is that SSTV is not really a digital mode. Well, it is, but; it is used along with voice. That is, on HF, SSTV is limited to the voice frequencies sub-bands. What this means is that SOME interface units do NOT completely interface your radio to the PC. They have left off the all-important microphone input jack. That is right, there is no way (using their

setup) to switch from a picture to voice at the touch of a button. They have no place to connect the microphone! I know at least one FM-SSTV'er that had been using two radios because of this. Like I said, be careful! OK, chest lighter.

So far, so good. If you are lucky, or did your homework; your radio and PC will get along just fine. If not, now would be a good time to review my list of Murphy's Laws. Most SSTV is currently on the HF bands. It was born there. I expect it will be there for a long long time, but; I'd like to see a lot more activity on VHF. I digress.

With HF style interfacing, if you have a cabling problem, there is a good chance you'll find someone that can help you out (on the air). HF microphone connections just are not that complicated. Even the accessory jacks (like I use) are well thought out and functional for digital modes including SSTV.

With VHF there is another problem. Eye, there's the rub. This is what I was building up to. Unfortunately it is going to get very technical real quick, sorry.

The VHF problem goes like this: To interface audio in, audio out and PTT you need to break the connection from the microphone to the radio. VHF radios, more and more, are using the microphone connections for lots of additional functions. This just never happened on HF rigs.

The modern VHF rig is built for small size. It is a mobile unit! There is not much real-estate on the front panel. There are new features never dreamed of on HF (DTMF, CTCSS). In order to access all these functions in a small rig it is mandatory to put controls on and in the microphone. Now we have a multitude of signals passing throu the mike cord. How do they do it without using a 25 wire mike cable?

They do it by multiplexing, and that my dear friend is the problem. There is the new bane of VHF Slowscanners. You can't easily break those multiplexed lines to insert SSTV.

What is multiplexing?

Multiplexing is the sharing of resources. In other words you can put over a hundred functions on only seven wires. Most manufacturers don't go to that extreme, but that is how they get a dozen or more functions on seven or eight wires.

Let me explain this way. If you have a switch that you want to run from one location to another (mic to rig), then you need 2 wires, the switched line and a ground or return line. If you have 4 switches that you want to run mic to rig, then you need 5 wires. The schematic looks like this [[CLICK HERE 4sx.gif](#)]. We could call this "machine language interfacing". If you need 8 switches, then you need 9 wires and so on. If you include a touch tone pad and a few other switches then you may need 23 switches and 24 wires. A cable with 24 wires is very thick and not very flexible. The number of wires can be reduced if you encode and decode using multiplexing.

You might recognize one multiplexing scheme as BCD (binary coded decimal). It is a

method of coding 10 different states on 4 lines (plus one ground line). There are other types of coding such as hexadecimal. There may be as many ways to multiplex as there are models of radios, so DON'T expect my examples to fit your radio.

I found at least one modern ham VHF radio / microphone that uses a different type of multiplexing. In place of using wires for multiple purposes, it uses serial data. It is the Icom HM-98S microphone, usable for Icom IC-207H, 2710H & 2100H [[CLICK HERE HM98.gif](#)]. This setup has about two dozen switches or functions (including DTMF). It interdigitates the switches and outputs a data stream using a 600 KHz clocked microprocessor, all built into the microphone. Of course only certain radios can decode the serial data. This microphone has a RJ-45 plug with 8 wires. The mic uses ground, serial data, power source, and a few others but does not use the PTT line. The PTT pin is there. The radio will transmit if you unplug the mic and short pin 4 (PTT) to pin 7 (gnd).

How do I know if I'll be affected?

If your rig has no functions (other than PTT and microphone use) on the microphone then you should not be affected and you can skip the rest of this section. If your rig has other functions then turn off your radio. Unplug the microphone. Locate a schematic of the microphone plug. With an ohm meter, see if the PTT line reads a short to ground when you press the button. If the reading is less than 10 ohms you are in good shape. You probably will not have any problems that can not be solved relatively easily. If the ohm meter reads a lot higher (over 100 ohms or more) you will not be so lucky.

How do I get around it?

If you figure it out, let me know and I'll publish it. Another HAM I know finally just replaced his entire radio to get around this problem. Boy, talk about over-kill, wow. When this happened to me, I was trying to interface a Rigblaster to a Kenwood TM-261A. I even called West Mountain Radio. They tried to help but they had no experience with that radio. I didn't really expect them to. They did offer to research it IF I would loan them my rig. No way that's gonna happen. They finally agreed to a refund (there were other things that lead to the refund) and I built my own interface from scratch. If you want a copy of my schematic, [email me](#) and I'll sent it to you.

What can the manufacturers do?

They can't avoid it, but they could add MORE features at little expense. I believe an added plug on the back of these radios could solve some of these problems. It could be an accessory plug, similar to HF rigs. It would be useful for Packet, APRS, SSTV and other things. It could include a key line that disables the front panel mike input, audio in and out, squelch switching, power level controls, RS-232 data, and a hole bevy of assorted items. "That would cost!" you say? Not that much, IF it were designed in, from the beginning. I expect a simple acc plug would not cost much more than a dollar. I do hope though that they stick to a standard plug. I am hopping for a DB-9 connector myself. They are cheap and plentiful thanks to the PC industry.

Some conjecture:

It might be that the problems I've come across are only significant IF one is trying to

retain use of all the functions of the microphone.

One case in particular involved an Icom IC-2100h. This rig was brand new and came with a multi-function microphone. Of course the new owner wanted ALL of his new toy to work. After failing the PTT ohm trick, I had to advise the owner of the following two choices: 1) Try a different model radio. 2) Use a standard, no frills, microphone with the rig. He chose to swap the rigs between his car and home. The next radio passed the PTT test.

Why try a standard, no frills, microphone? All modern rigs that I've come across show the pin-out for the microphone plug in the manual. So far they all LOOK straight forward. One would think they would not have this problem I've been describing. There is no clue in the manual that the microphone is multiplexed. Of course the manual doesn't show the inside electronics of the microphone. If you disconnect the microphone and at the radio, short the PTT line to ground, the radio will transmit. Yet, the multiplexed microphones do not short the PTT line to ground. So, if a standard microphone will work on the radio, and the multi-function microphone causes a problem, then just use a standard microphone.