

JT65 — The “Musical” Mode

If you’ve been hearing something that sounds like music on the HF bands lately, it may not be your imagination.

Steve Ford, WB8IMY

“Im hearing a strange signal on several HF bands. It sounds like someone sending random tones or music. It plays slowly for almost a minute, stops for a while, and then plays again. What is it?”

At the time this article was written, this question was arriving in e-mail IN boxes of the ARRL Headquarters Regulatory Branch at a rate of about one per week. Some amateurs even send audio recordings of the suspicious signals. Chuck Skolaut, KØBOG, our Field and Regulatory Correspondent, always smiles as he listens to the recordings because he knows the answer by heart: JT65.

By now amateurs are used to the sounds most digital modes create. They’ve learned to recognize the constant warbling tones of PSK31, the rhythmic pulses of PACTOR, the scratchy rumbles of Hellschreiber or the multi-tone music of RTTY, MFSK16, Olivia and others.

But JT65 is unique. It marches, as Thoreau said, to the beat of a different drummer. If you’ve never heard it before it will stop you cold. As you tune across a JT65 signal you’ll hear tones of varying pitch that “play” slowly, like someone lazily blowing on an electronic flute.

Cryptic and strange as the tones may be, you might be surprised to learn that they carry call signs, signal reports and other bits of information. Even more surprising is the fact that this information can be extracted even if the JT65 signal is almost inaudible.

The “JT” in JT65

JT65 debuted as part of the WSJT software suite created by Dr Joe Taylor, K1JT. As a Nobel Prize winning scientist who studies pulsars and other distant astronomical objects, Joe has a keen interest in weak signals. Joe’s software exploits the power of modern desktop and laptop computers to separate weak signals from noise and decode the information they contain. With just a transceiver and a sound-equipped computer or an external sound device, WSJT makes it possible for hams with modest stations to enjoy VHF meteor scatter communication and even moonbounce, in which signals are literally bounced off the surface of the Moon and returned to Earth.

Soon after its debut, JT65 attracted the attention of the moonbounce community and it was an instant success. Thanks to JT65, amateurs with single long boom Yagi antennas and 150 W of RF output could experience the thrill of communicating over the longest “long path” of all.

But it wasn’t long before someone wondered what would happen if JT65 were used on the HF bands. Digital communication on HF isn’t nearly as challenging as getting a signal to the Moon and back, so it stood to reason that there would be plenty of “performance margin” to provide fascinating results here on Earth. To no one’s surprise, this turned out to be true. Using a variant of JT65 known as JT65A, even a few watts of JT65 modulated RF applied to a wire dipole antenna resulted in transcontinental and even global communication.

Dedicated JT65 Software

JT65 is one of several modes in the WSJT package, available for free downloading on the web at physics.princeton.edu/pulsar/K1JT/Download.htm. However, John Large, W4CQZ, thought more amateurs might try JT65 on HF if it were available in a form designed to appeal to the less computer savvy among us. The result was his JT65-HF appli-

cation and it soon proved John’s hunch correct.

Since John’s software appeared, JT65 activity on the HF bands has increased substantially. As with WSJT, JT65-HF is also free for downloading at jt65-hf.sourceforge.net/.

So What is JT65 Anyway?

The short and simplified answer to this question is that JT65 is a weak signal digital mode that uses precisely timed transmit-receive sequences. You transmit for about one minute and listen for one minute. Transmission actually begins 1 second after the start of a UTC minute and stops precisely 47.7 seconds later. There is a 1270.5 Hz synchronizing tone and 65 other tones. The combination gives JT65 its unusual musical quality.

Tight time and frequency synchronization is critical to JT65. Your SSB transceiver needs to be reasonably stable, although I’ve yet to see a modern commercial radio that is too “drifty” for JT65. Drifty computer time is a different matter, however. Windows PCs are notorious for sloppy timekeeping. You can’t always rely on the Windows Internet time application to keep you in sync. Instead, I recommend the free time-synchronizing application *Dimension 4* that you can download at www.thinkman.com/dimension4/. Install the application and set it up so that it

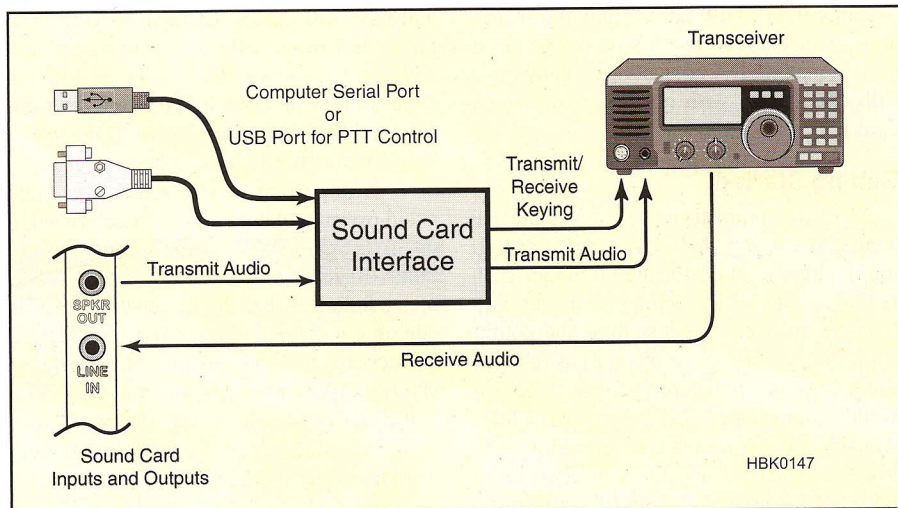


Figure 1 — To operate JT65, you’ll need an interface between your computer and your transceiver.

