

# **HISTORY OF SINGLE SIDEBAND IN AMATEUR RADIO Page 1**

**by James W. Nash, K4HMS/V31AW**

On the night of September 21, 1947, bizarre sounding voices appeared on the 75 meter phone band. These strange signals were audible in California and adjacent states. In fact, they came, not from outer space as some might have thought, but from W6YX, the club station of Stanford University, operated by O. G. Villard, Jr., W6QYT. (Villard, 1948.)

No doubt there were listeners out there who could not believe their ears. But what they were hearing was actually single Sideband modulation. This event represented the beginning of the postwar SSB revolution in amateur radio. It was the most important technical development to hit the hobby since spark gave way to CW. As we have seen, its implications have gone far beyond the technical.

We all owe Villard and his co-experimenters a debt of thanks for bringing us SSB when they did. However, it's worth knowing that single sideband had already been around for over thirty years. And, not only that, hams had been on the air with the squawky stuff as early as 1933.

## **Discovering SSB**

During 1954, I bought my first shortwave radio, a used Hallicrafters S-53 (cost \$40), and launched my short career as a pure SWL—I would receive an amateur license the next year. One night, tuning around between Radio Moscow and the BBC, or whatever, I was astonished to hear ducks talking. Yes, a twelve year-old SWL in Georgia had discovered that ducks were indeed on the radio. For there was, sure enough, Donald talking to his goofy nephews. It never occurred to me that, in theory, I could tune this stuff into English by flipping the toggle switch which said "BFO" and making some very careful adjustments.

I had, of course, discovered single Sideband transmission. In the next few years, I received a Novice and then a General license. At the ramp-up to the peak of Cycle 19, I tried "phone," meaning AM, and liked it a lot. For me, the big fun was on 15 meter phone, especially since I had a 3-element Yagi for the band. After all, the Globe Scout put out only 50 watts on AM.

SSB was still in the experimental stages as far as I knew. So while I worked AM, as well as CW, I would hear the duck-talkers up there in their own part of the band. Quacking away.

Then my career on phone hit a major snag. Because then came those phone calls to my parents from the neighbours. The problem was that many of the TV's still used 21 MHz IF's. Well, despite the helpful efforts of the Kennehoche ARC TVI Committee, I went back to CW. Except for my long absence from the air in the later 70's and much of the 80's, I've been there for the most part since.

As for Sideband, I forgot it was even there for a long time. In 1988, however, inspired

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by news stories of the newly approaching peak of Cycle 22, I acquired a TS-680S. With the help of my two youngest children I erected a G5RV antenna. After a long absence I got back on the air. I soon discovered this newfangled transceiver had SSB on it. I tried it out and was overwhelmed with its superiority to AM. How could I have missed this for so long? And how long had it really been around? I remembered hearing sideband 30 years before, but I had thought it was something brand new. I was wrong.

### **Bell Labs and Others**

Well, it's like this. The story starts in 1915, when mankind discovered Sidebands. Now possessing this superior understanding of the AM signal, radio scientists began to understand the implications of their discovery. Soon afterwards, our old friends at Bell Labs, who have discovered practically everything, developed a method for removing one of the Sidebands of an AM signal but retaining all the essential modulation components. As an expert of that day supposedly said, "both Sidebands are saying the same thing" (Goodman, 1948).

Or, as the Messenger said in one of his mysterious transmissions many years ago, "some day you will gain many dB, for both Sidebands say same thing."

Bell soon discovered that it was possible to increase the capacity of overseas telephone circuits using SSB modulation, and such circuits were in telephonic use by 1918. The first single Sideband radio transmissions occurred by 1923. From the beginning equipment stability problems slowed development of SSB. In 1927, a trans-Atlantic SSB commercial radio circuit was in place, but at low frequencies. In fact, it was in the mid-1930's before commercial shortwave SSB was practical—the frequency stability problems were solved by using new generation AFC equipped receivers and a pilot carrier from the transmitter.

### **Hams at Work**

By the time the 1930's came along, licensed amateurs were hard at work on the problem. Apparently the all-time ham radio SSB pioneer was Robert M. Moore, W6DEI. He published three articles on the subject in *R9* magazine in 1933 and 1934. At that point, this experimental mode was referred to as "single Sideband suppressed carrier" transmission, or SSSC. The articles reveal that what Moore was talking about was real single Sideband. In his articles he acknowledges the prior work of Bell Telephone Laboratories in developing the techniques he was using. (Moore, 1933, 1934.)

Another pioneer in this endeavour was J. Evans Williams, W2BFD, who in 1948 wrote a letter to QST pointing out that Moore was indeed the original 1930's ham radio SSB pioneer. Williams himself build a 500 watt SSSC transmitter based on Moore's designs, and reported in his letter that a half-dozen or so Sideband stations

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had been on 20 meters during the 1930's.

As Williams also pointed out, the idea simply did not yet catch fire. One reason was that the bands were not yet so crowded. Another was that many hams had only recently become involved in AM in the first place—those were the days when one started in CW—and had recently built or purchased new AM equipment. Finally, FM was coming on the scene and many of its advocates claimed that it alone was the mode of the future. So SSSC had to wait a while.

### SSB Takes Over

What finally made SSB feasible for amateurs was a workable solution to the problem of transmitter stability. This came after World War II, with the work of Villard and others. The techniques which were ultimately most workable involved a balanced modulator which generated the Sidebands, but no carrier, followed by a Sideband filter which eliminated one of them.

The phone bands were really jammed in the 1950's, much worse so than today. This was largely because of the width of AM signals. The ham community soon grasped the fact that SSB was more than a way to get 8 dB. It was a long term solution to the problem of bands jammed every night with heterodynes howling like banshees. I'm not sure how many of us today realise how vital SSB has been to the history of the avocation. After Sideband became well-established the process of working DX on phone with moderate power and antennas became vastly easier. By the early 1970's, there was more DX on Sideband than on CW, and the gap has probably continued to grow ever since.

Of course, in the 1950's we non-SSB heathens still referred to it as "duck talk." Yet it was soon established that any receiver with adequate frequency stability and a variable BFO could receive this squawky stuff so that it sounded more or less human. Also, a clever ham without an expensive receiver could get some help from a frequency meter or VFO (most of us had separate ones in those days), for use in carrier reinsertion.

It was the early sixties before commercial rigs with sideband were widely available. I'm not sure which manufacturer put out the first commercial ham SSB rig. (If you know, let me know.) But by the late 1960's SSB had come to dominate the phone bands. Today the terms "phone" and "Sideband" are synonymous.

As for me, a ham who had worked AM in the 1950's, my first QSO on SSB came in 1988. I was amazed at the ease with which one could work phone DX with 100 watts and modest antennas. The clarity and capability of reading signals in QRM was remarkably improved over the AM of my boyhood. And although today my preference still remains strongly for CW, that is a personal preference.

The Collins KWM-1: One of the first SSB rigs.



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Without single Sideband, I'm not sure amateur radio would be nearly as strong an institution as it is today. Who knows what will come next?

### NOTES

Goodman, Byron, W1DX. "What is Single-Sideband Telephony?" *QST*, January 1948, pp. 13-15, 126 ff. If you don't know, Goodman was the first editor of "How's DX" back in the 1930's.

Moore, Robert, W6DEI. "Single Sideband Transmission," *R9*, September, December, and January, 1933-1934 (three installments).

Villard, O.G., W6QYT. "Single-Sideband Operating Tests," *QST*, January 1948, pp. 16-18, 128, 130.

Williams, J. Evans, W2BFD. "SSSC," letter to the editor, *QST*, February 1948, p. 64.

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