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Shortwave Radiogram

Introduction

At various UTC dates/times and frequencies starting from Thursday through to Tuesday, a 30 minute weekly shortwave radio program (see Figure 1) specially designed for digital modes radio hobbyists is produced by Dr. Kim Andrew Elliott, KD9XB (see Figure 2, next page). It started as Voice of America (VOA) Radiogram in March 2013 using VOA's amplitude (or ancient) modulation (AM) analog transmitters located near Greenville, North Carolina. However, when Kim retired in 2017, the VOA declined to continue his program on a contract basis so he found new sponsors and changed the name to Shortwave Radiogram. It's now broadcast by privately owned/operated US international shortwave radio stations.

Figure 1: Shortwave Radiogram Waterfall Identification
A voice over introduction plus a custom graphic is transmitted at the start of each program.

The program allows Kim and his worldwide listening audience to conduct various data modes experiments (listeners often send suggestions) using ordinary shortwave radio receivers (solid state or tube) or more modern software defined radios (SDRs) and web SDRs using Windows/Linux computers and/or Android tablets/smartphones running the free digital signal processing (DSP) program "fldigi" (Windows/Linux) or "TIVAR" (Android). For a half-hour, text (often using various fonts and languages) containing interesting international topics of the week along with related images are transmitted (see Figure 3, next page). Once a program is finished there's almost immediate feedback about signal reception using email and social media platforms for group discussion and analysis.

Figure 2: Dr. Kim Andrew Elliott, KD9XB

Credit: Photo by Magda Hishmeh; ARRL member spotlight, *QST*, December 2016 Used with permission; copyright ARRL

User feedback also helps the fldigi programming team to make improvements or add new/experimental data modes to fldigi, which is the digital signal processing (DSP) software used to produce and decode each weekly program. Additionally, all programs are recorded and archived for future access.

The Way it Was

Like most of us of a certain vintage, Kim cut his teeth during the Cold War era of battling ideology international shortwave broadcast stations (Democracy versus Communism). Shortwave radio "magic" was king back in those heady before internet days. You would send (via snail mail) signal reception reports to broadcast stations and they would send you back (via snail mail) a confirmation of receipt (QSL) card (see Figure 4, next page). But by end of the 20th century, shortwave radio's glory days were over because the internet quickly became the backbone for most international and domestic media broadcasters to easily and quickly disseminate programs or propaganda along with other consumer services to a much larger listening audience.

Figure 3: Sample Fldigi Received Text and Image

Screen capture of transmitted text followed by an image decoded using fldigi. Decoding and data mode switching is made fully automatic by enabling fldigi's RxID feature (upper right corner). Plus you can go off and do something else during program reception because everything is fully automatic!
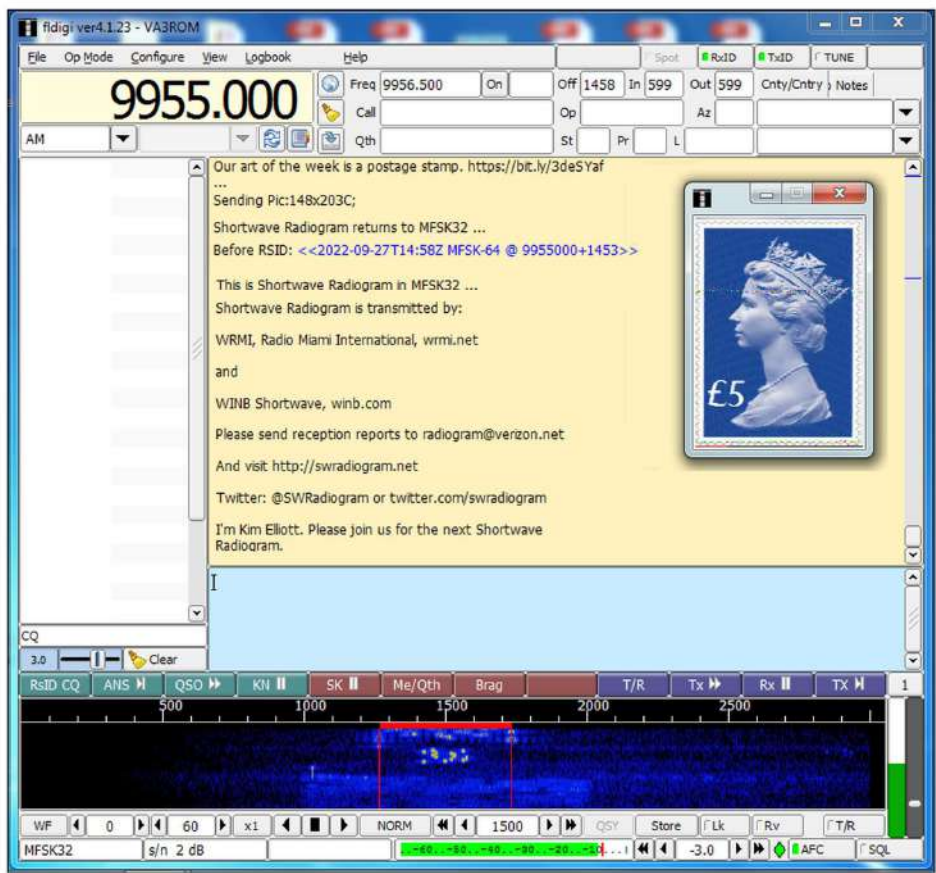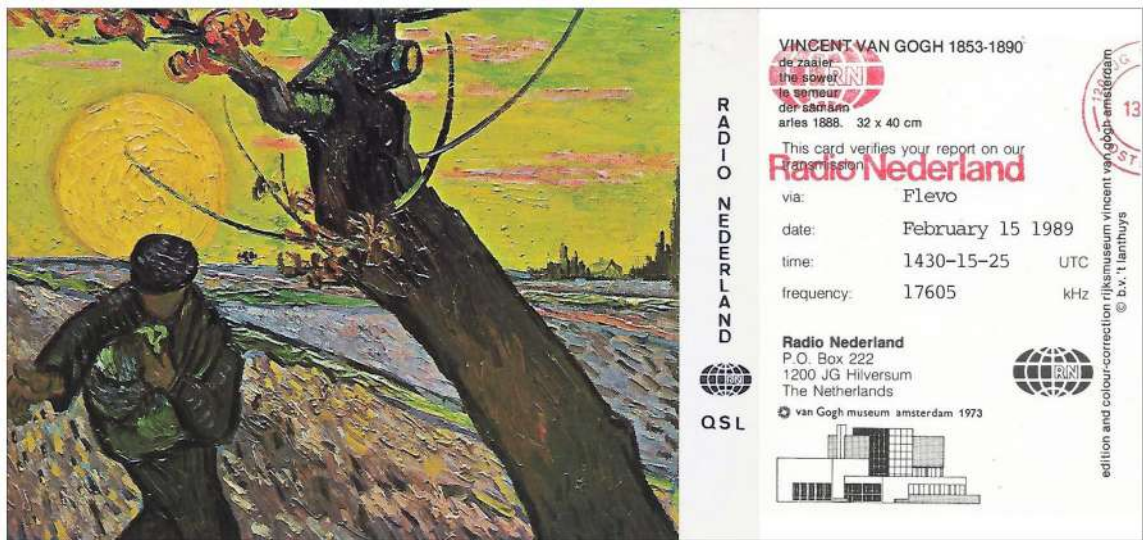

Figure 4: QSL Cards as Art (When Shortwave Radio Ruled the World)

I'll never own a real Van Gogh so this art QSL card from my collection will have to do.

About Kim

Note: Biographical material is from the "Member Profile" column, December 2016 issue of QST. Used with permission; copyrighted by the American Radio Relay League (ARRL).

Kim has a BA in international affairs, which is the scientific study of interactions between sovereign states plus an MA and PhD in communications, which includes public speaking, group dynamics, argumentation, rhetorical strategies and effectively using various forms of media to influence listeners ("The medium *is* the message"—Marshall McLuhan). From 1985 to 2017, he worked for the VOA as an audience research analyst and later as the producer/presenter of "Communications World" (1995-2002) covering the ongoing developments and use of various media technologies in international broadcasting. He has written articles for publications such as *Radio World, Monitoring Times and the (US) Foreign Service Journal.*

Kim's interest in digital data modes (and Amateur Radio) happened quite by accident when he saw a demonstration of "phase shift keying, 31 baud" (PSK31), which was the most popular keyboard texting mode at the turn of the century, during a visit to the VOA's Amateur Radio club station (K3VOA). He was amazed that text could be decoded and displayed on a computer monitor even under marginal signal reception conditions when speech would be too difficult to understand. Having studied international affairs, he was also well aware that governments and/or manmade/natural disasters can easily cut off internet access along with other forms for civilian communications. When all else fails, radio to the rescue! Kim had the brilliant idea that unmodified shortwave radio transmitters, combined with Amateur Radio data modes and free DSP software, could be used to get factual information into areas cut off from the outside world. His broadcast experiments have successfully shown that certain data modes can be used to send text messages surreptitiously and still be successfully decoded by fldigi/TIVAR even when masked by atmospheric noise, speech or even music or jammed by other radio signals!

The Broadcast Stations (WRMI and WINB)

See Figure 6, next page, for broadcast times and frequencies. Located in Okeechobee, Florida, WRMI Radio Miami (formerly WYFR Family Radio) is a brokered secular content international shortwave radio broadcasting station with one 50,000 and twelve 100,000 watt transmitters (see Figure 5). Radio airtime is sold to various outside agencies, companies and organizations including radio relays for several foreign broadcasters such as Radio Ukraine, Radio Slovakia, Radio Tirana and Radio Prague.

Figure 5: WRMI Radio Miami
Aerial view of the WRMI site as it was prior to Hurricane Ian struck. Various frequency specific beam-type antennas are used: rhombic, double-rhomboid (a "cousin" of the rhombic), log periodic and dipole curtain with reflecting screen. Credit: WRMI Radio Miami.

Note: Hurricane Ian (a very strong category 4) battered Florida at the end of September 2022 with 250+ kph winds that created a much more devastating inland storm surge that destroyed most of WRMI Radio Miami's antenna systems. The station is slowly but surely returning to normal.

WINB is a brokered Christian content international shortwave radio station located in Red Line, Pennsylvania, and the oldest operating privately owned shortwave radio station operating form within the US. WINB has one 50,000 watt transmitter and one 12,500 watt digital radio mondiale (DRM) digital audio broadcast (DAB) transmitter. DRM never really took off in North America.

WINB began broadcasting in October 1962 (coinciding with the Cuban missile crisis) and during the antiestablishment, counterculture revolution of the 1960's, WINB became famous (or infamous) for its vitriolic criticism of US domestic and foreign policies. President Nixon tried to use the regulatory powers of the Federal Communication Commission (FCC) to shut it down.

Figure 6: Fall/Winter Program Schedule
Times and frequencies change with the seasons of the year and shifts between daylight saving and local time. Credit: Shortwave Radiogram.

UTC Day	UTC Time	Frequency	Transmitter
Thursday	0030-0130 UTC	9265 kHz	WINB Pennsylvania
Friday	1300-1330 UTC	15770 kHz	WRMI Florida
Friday	1500-1530 UTC	15755 kHz DRM	WINB Pennsylvania
Saturday	0330-0400 UTC	9265 kHz	WINB Pennsylvania
Sunday	2330-2400 UTC	7570 kHz	WRMI Florida
Monday	0800-0830 UTC	5850 7780 kHz	WRMI Florida
Tuesday	1530-1600 UTC	9955 kHz	WRMI Florida

Now many readers may think that over-the-air shortwave radio broadcasting is an absolute anachronism, but in this new age of heavy reliance on internet streaming and social media and other internet news (or propaganda) platforms there are still many areas of the world where internet access is heavily controlled and/or restricted by oppressive governments. Additionally, fibre-optic cables carry and deliver the bulk of the world's high speed digital content: internet, cable/digital television, banking and telephone systems, etc., but like any other landline they are vulnerable to natural, accidental or deliberate damage. Whenever the lights go out, and Wi-Fi, cellular and most other civilian communications systems go south, a portable windup/solar powered AM/FM/weather/shortwave radio packed inside your emergency grab 'n go-kit may be your only lifeline—literally (aside from Amateur Radio)—to find out what's going on around you and what you should do or not do

Preparing Broadcast Material

I sent an email and asked Kim how he went about preparing content for each weekly program and here's his (edited) reply:

> "I compose the text using a text editor then paste it into the transmit pane of fldigi. I use fldigi's 'TX generate' feature (File > Audio > TX generate) to create a WAV audio file. Any images are also created in sequence with the text, again using Fldigi's 'TX generate'. Then I open the audio file with Audacity and do whatever editing is needed. Then the audio file is exported to an MP3 audio file, which is what WRMI and WINB require, and is uploaded to them via FTP."

My Final

As an aside, using Kim's simple methodology, you can work at your own pace and leisurely prepare material, say for an Amateur Radio demonstration and test it beforehand. I also use Audacity (it's free) because it has absolutely amazing audio processing and editing features that anyone can easy master. You can record any Shortwave Radiogram or other radio program audio using fldigi's (File > Audio > RX capture) then use Audacity afterwards to clean-up the resulting WAV audio file using Audacity's digital audio filters then loopback that audio to fldigi to reprocess it by using a virtual audio cable (VAC) such as the free VB-CABLE.—73

References and Resources

Audacity https://www.audacityteam.org

Fibre-optic Communications https://tinyurl.com/3wpajbfh

Fldigi http://www.w1hkj.com

Shortwave Radiogram Decoding How-To https://tinyurl.com/3aknhcx7

Shortwave Radiogram https://swradiogram.net

Using TIVAR How-To https://tinyurl.com/2mse4by5

VB-CABLE https://vb-audio.com/Cable

Virtual Audio Cable (VAC) https://tinyurl.com/562sbeer

Voice of America https://tinyurl.com/389tdaw8

WINB http://winb.com

WRMI http://www.wrmi.net