See You On The Radio!

An Introduction to Slow Scan TV

Happy New Year! I hope 2017 will be an exciting and dynamic ham radio year for you. Last month, I urged readers to shake up their ham radio "comfort zone" and to explore a new aspect of the hobby. This month, I'd like to continue with that theme, but first I'd like to thank you for your comments. I always enjoy hearing from readers.

My article in the October 2016 issue guiding readers on how to waterproof connectors was

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Photo A. Harry Johnson, NV7K, uses silicon tape for waterproofing connectors. (Courtesy of Harry Johnson, NV7K)

Photo B. Al Ward, W5LUA, making a 10-GHz EME (moonbounce) contact with Europe from St. Louis, Missouri at the 2016 Microwave Update conference. (Photos B-M by KOØZ)

popular and I'd like to pass along one reader's response. Harry Johnson, NV7K, writes: "Just to add two cents worth, here's what I do for waterproofing. I use silicone tape, very thin and fuses to itself. I get it from High Sierra Communications Products in Grass Valley, California. I work in an area about 3 inches from either side of the tightly connected fittings and do a double layer wrap while putting tension on the tape so that the wrap layers are tight on each other. When I cut the tape at the end of the process I press the cut end tightly to the layer below it. I live in southwest Minnesota where we have rain, wind, and deep snow. [It's] worked for me for a long time and can be easily removed if necessary." (*See Photo A*)

I deeply appreciate Harry's comments for I have relatives in the Land of 10,000 Lakes and Minnesota certainly defines a cold, harsh, wet coaxial connector environment! Thank you for sharing, Harry.

Goin' for the Gigs…

In keeping with the spirit of trying something new, I'd be remiss in my duties if I didn't practice what I preach. So, this is what your editor is up to this new year: I am in the middle of building a 24-GHz transverter. In October, I attended the 2016 Microwave Update conference (MUD 2016) and I saw Al Ward, W5LUA, make 10 GHz, yep that's right, 10 G-I-G-A-Hertz EME (Earth-Moon-Earth) QSOs with several Europeans (*Photo B*). Of course, seeing Al and the rest of my friends at MUD gave me an enthusiasm booster shot for my project. Don't fret, I'm not going to devote this month's column to microwave EME, but setting new goals can literally mean shooting for the stars.

Instead of Stars, Why Not Shoot Pictures?

This month, let's explore another mode that's found on the ham radio bands. Some ham radio literature considers this mode to be exotic, but it's not much more complicated than operating SSB (single sideband) and like sideband, it is regularly found on the HF bands. The "exotic" mode I am writing about sends still pictures across the airwaves using a transceiver, a computer, and a soundcard. A television camera isn't needed as part of the operation. It is a lot of fun simply looking at transmitted pictures and even more fun to operate. Slow Scan TV (SSTV) is somewhat like looking at a slide show. Standard fast-scan television (now high definition) instantaneously shows a "live," real-time picture. In contrast, SSTV takes anywhere from half a minute to well over a minute to send one frame, depending on which SSTV

Photo C. Ace, W6LYS, inviting ops to reply to his SSTV CQ.

Photo D. W6LYS sending me an SSTV signal report. Note that the picture I transmitted is contained in the lower left-hand corner of Ace's return transmission.

format is being used (more on these later). *Photo C* depicts a received SSTV picture from W6LYS calling CQ.

Where is SSTV Usually Transmitted?

Since an SSTV signal occupies the same amount of bandwidth as an SSB signal, which is around 3 kHz, this mode is mostly found in the phone portion of the HF bands. Typically, SSTV is found on 14.230 and 14.233 MHz USB (upper sideband), but it is also heard and seen on 7.171 MHz LSB (lower sideband), 21.340 MHz USB, 28.680 MHz USB, 50.680 MHz USB, 145.500 MHz USB, and 430.950 MHz USB. To be sure, most SSTV activity centers on the HF bands. If your license class restricts you from transmitting SSTV in HF bands, take heart, everyone can still *copy* SSTV transmissions, which is a lot like shortwave listening (SWL) for international broadcast stations. Even more good news is that SSTV can also be transmitted in the VHF and UHF bands. See above for commonly-used frequencies in the 6-meter, 2-meter and 70-centimeter bands. On these cold, bone-chilling, winter nights, sending an SSTV picture of a recent family outing or a current workbench project to a nearby friend is not a bad way to spend the evening (*Photo D*).

Getting Started

If you have a ham radio transceiver, a computer with a sound card, and an audio patch cord to go between the audio output of the radio and the computer sound card input, then you're ready to receive SSTV. However, before you can begin to receive SSTV, you'll need to download some software, such as the SSTV program MMSSTV. Fortunately for all of us, Makoto Mori, JE3HHT, developed and makes this program available free of charge <http://hamsoft.ca/pages/mmsstv.php>. Mako's free program is intuitive and there is plenty of online help.

After downloading the program, a pop-up window will ask you to fill in your call sign. Another option is to go to the menu bar at the top of the screen and under **Option** (*Photo E*), scroll down to **Setup MMSSTV** and then click on the **TX** tab (*Photo F*). This window has two important items. Enter your call sign and, if you wish to transmit SSTV, enter the computer com port that will be controlling your rig's PTT (push-to-talk). Don't confuse this cord with your audio patch cord. The TX screen only involves transmitting SSTV. If you are only interested in receiving SSTV proceed to the **Misc** tab
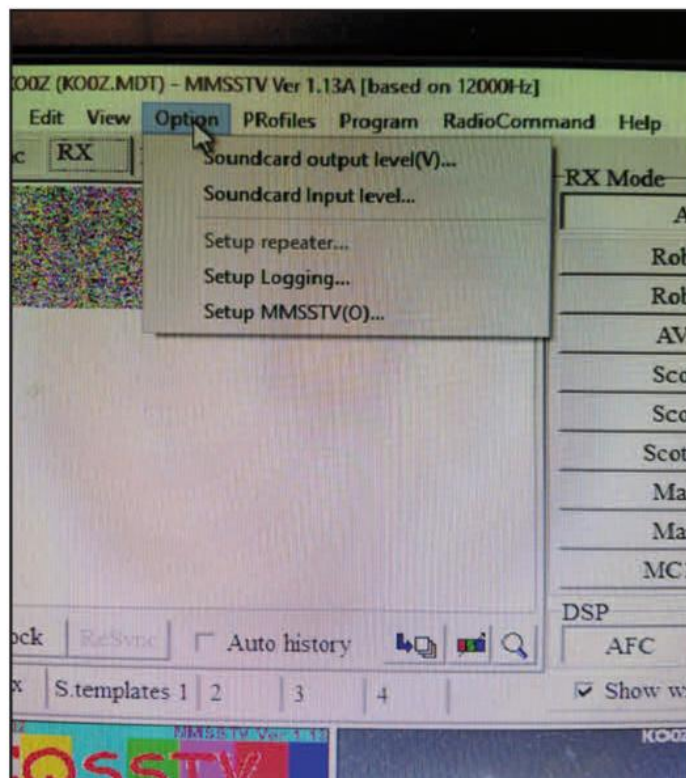

Photo E. MMSSTV Option tab used to make MMSSTV operational with your PC.

(*Photo G*). Towards the top left-hand corner, please notice **Sound Card In** and **Out**. Make sure your computer's soundcard is selected in this section. Otherwise, your computer won't decode the SSTV signals being fed into its soundcard. If you have an external soundcard such as a Rigblaster, then select it.

You're now almost ready to receive SSTV. The next step is to set the audio input level from your rig's audio to your soundcard input. Once again under the **Option** tab, there is a scroll down menu item (**Soundcard input level**) that will allow you to properly set the audio input. External sound cards

like Rigblasters have an external knob that allows for audio level setting.

Receiving SSTV

Before receiving an SSTV signal, let's familiarize ourselves with MMSSTV. The program opens to a page that will allow SSTV reception and transmission (*Photo H*). Once MMSSTV is configured to your sound card, tune your rig to 14.230 USB and wait for a signal. Towards the upper left-hand corner of the program is the reception window. To the right of the reception window is found the **RX Mode** menu. **Automatic** is the default button. Below **Automatic**, several other SSTV formats such as
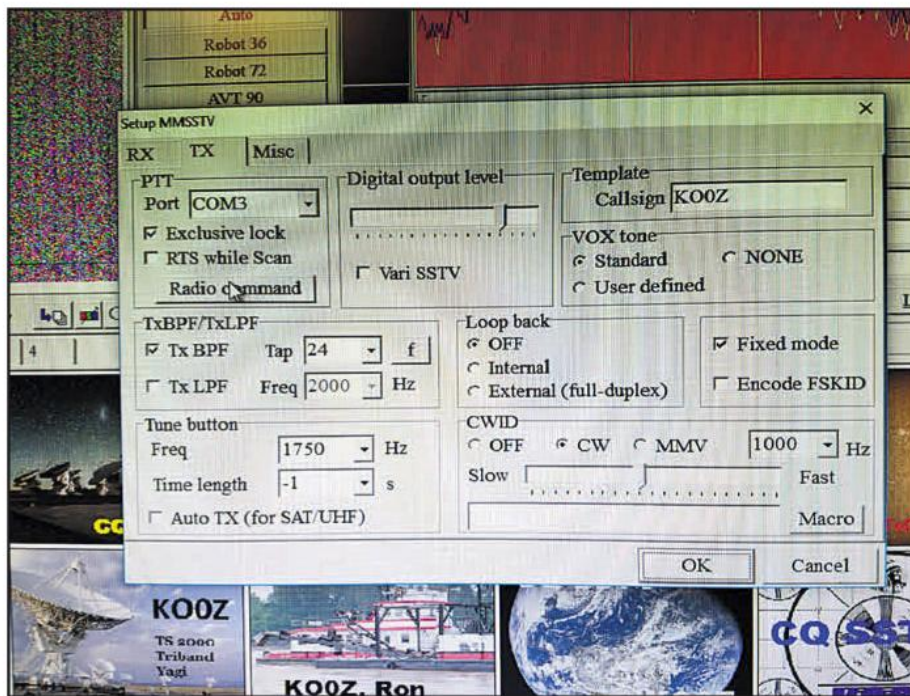

Photo F. MMSSTV Transmit tab is used to enter your callsign and the computer com port for PTT.

Photo G. The MMSSTV Misc tab is where the sound card being used for SSTV is configured.

Photo H. What MMSSTV looks like on the computer screen. Note the receive window in the upper left-hand corner, the spectral display with waterfall in the upper right-hand corner. Transmit templates fill up the rest of the screen.

Robot, Scottie, and Martin are listed. If a strong enough SSTV signal is detected and tuned in properly, MMSSTV automatically switches to the proper SSTV format.

To the right of the **RX Mode** is a screen that displays received signals. Note the 1200-Hz marker (sync) and the 1500-, 1900-, and 2300-Hz markers (*Photo I*). Turn your rig's VFO so
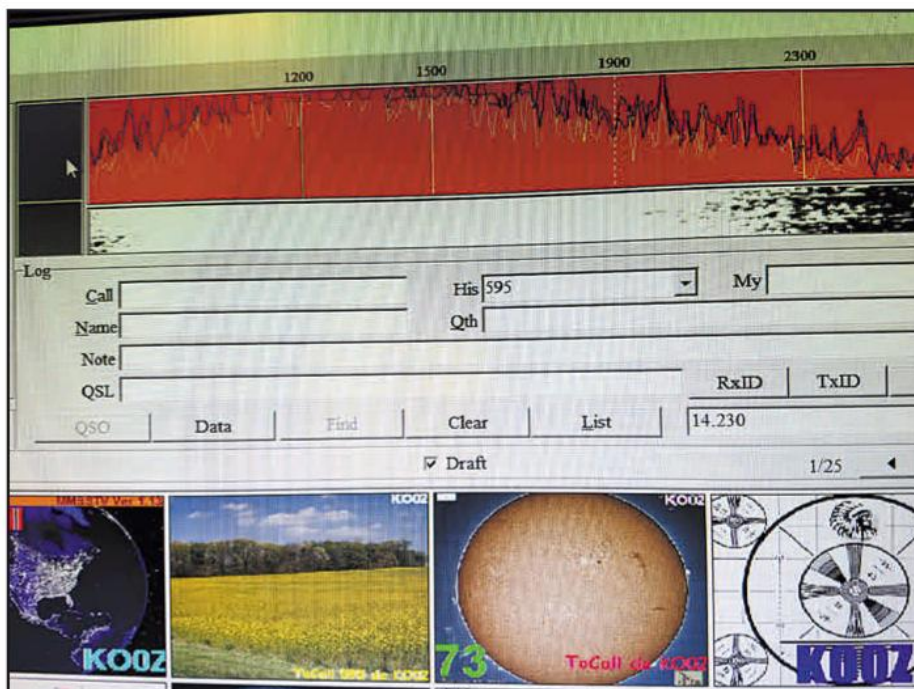

Photo I. MMSSTV spectral display with waterfall showing markers for the 1200-Hz sync signal and the picture converted to audio tones all the way to 2300 Hz.

that the sync pulse lines up with the 1200-Hz marker, as soon as the sync is detected, a green level will display immediately to the left of the spectral display window and waterfall. As soon as the level display turns green, the picture will automatically begin to decode and to display in the window. This is where the fun begins. It's exciting to get pictures from around the world (*Photo J*). Recently, I enjoyed an SSTV QSO with Fernando, KP4MP, from Puerto Rico (*Photo K*). With MMSSTV, a received SSTV picture starts filling in the receive window from top to bottom, line by line (*Photo L*) until the scanning is finished at the bottom of the frame (*Photo M*).

If you look at the SSTV photos throughout my column, you may have noticed some lines running horizontally through them. These lines are caused by static or QRM. To determine picture quality, SSTV ops use a variation on the RST (Readability Signal Strength and Tone) system called the RSV (Readability, Signal Strength, Video) system. A report of 595 would indicate a very strong, clear, signal.

Some SSTV operators are replacing the imprecise "V" component of the signal report with a more clearly defined

WORLDWIDE — The Novice Rig Roundup will be held from 0000 UTC Saturday, February 18 through 0000 UTC Monday, February 27. For more information and rules contact: Brian Carling <ah4k@hotmail.com>. Website: <http://novicerigroundup.com>.

BRIGHTON, COLORADO — The Aurora Repeater Association, Rocky Mountain Ham Radio, and **Cherry Creek Young Amateur Radio Club** will hold the **ARA Swapfest** Sunday, February 19 at the Adams County Fairgrounds, 9755 Henderson Road. Contact: Wayne Heinen, NØPOH, (303) 699-6335. Email: <info@n0ara.org>. Website: <http://n0ara.org>. Talk-in 147.15+ (PL 100). VE exams.

LIVONIA, MICHIGAN — The Livonia Amateur Radio Club will hold its **46th Annual Swap-N-Shop** Sunday, February 19 at the Civic Park Senior Center, 15218 Farmington Road. Contact: Livonia ARC, P.O. Box 51532, Livonia, MI 48151-0532. Phone: (734) 941-5043. Email: <k8uns@arrl.net>. Website: <www.livoniaarc.com>. Talk-in 145.35 (PL 100).

BIG FLATS, NEW YORK — The K2LIM Contest Group will hold its **Winter Hamfest** Saturday, February 25 at the Big Flats American Legion, 45 Olcott Road S. Phone: (607) 739-7305. Website: <www.ka2lim.com>. VE exams.

LA PORTE, INDIANA — The La Porte County Amateur Radio Club will hold the **Cabin Fever HamFest** Saturday, February 25 at the La Porte Civic Auditorium, 1001 Ridge Street. Contact: LPARC, P.O. Box 148, Michigan City, IN 46361. Phone: (219) 851-2143. Email: <cabinfeverhamfest@gmail.com>. Website: <http://lparc.org>. Talk-in 146.610 (PL 131.8). VE exams.

DALTON, GEORGIA — The Dalton Amateur Radio Club will hold its **Annual Hamfest** Tuesday, February 28 at the Dalton Fairgrounds. Contact: Tom Smith, KI4IG, <ki4ig@windstream.net>. Website:<http://w4drc.webstarts.com>.

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RUSSELLVILLE, ARKANSAS — The Arkansas River Valley Amateur Radio Foundation will hold the **25th Annual Russellville Hamfest** and **2017 ARRL Arkansas Section Convention** Saturday, March 4 at the L.V. Williamson Boys and Girls Clubs of the Arkansas River Valley, 600 East 16th Street. Contact: Jonathan Setcer, N5QT, (501) 580-5789. Website: <www.arvarf.com>. VE exams.

CONCORD, NORTH CAROLINA — The Mecklenburg Amateur Radio Society will hold the **Charlotte Hamfest 2017** Friday, March 10 and Saturday, March 11 at the Cabarrus Arena & Events Center, 4551 Old Airport Road. Phone: (704) 948-7373. Website: <http://charlottehamfest.org>. Talk-in 146.655 or 146.940 (PL 118.8). VE exams, card checking.

PUYALLUP, WASHINGTON — The Mike & Key Amateur Radio Club will hold the **36th Annual Mike & Key ARC Electronics Show & Fleamarket** Saturday, March 11 at the Pavilion Exhibit Hall-Washington State Fair Grounds, 110 9th Avenue SW. Contact: Diane Dinkelman, (253) 631-3756. Email: <ddmdink@gmail.com> or <n7wa@arrl.net>. Website: <www.mikeandkey.org>. Talk-in 146.82- (PL 103.5). VE exams

GEORGETOWN, TEXAS — The Williamson County Amateur Radio Club will hold the **WCARC Swapfest** Saturday, March 18 at the Community Center, San Gabriel Park, 455 E. Morrow Street. Website: <http://wcarc.com>. Talk-in 146.64 (PL 162.2). VE exams.

KALAMAZOO, MICHIGAN - The Southern Michigan Amateur Radio Society will hold the **Michigan Crossroads Hamfest and Radio Swap** Saturday, March 18 at Wings Event Center, 3600 Vanrick Drive. Contact: Jay Jarrett, N8ARR, (269) 815-8007. Email: <crossroadshamfest@w8df.com> Website: <www.w8df.com/hamfest>. Talk-In 147.000- (PL 94.8). VE exams.

SCOTTSDALE, ARIZONA — The Scottsdale Amateur Radio Club will hold the **Scottsdale Springfest** Saturday, March 18 at the Scottsdale Bible Church-Mountain View Campus,17705 N. Pacesetter Way. Website: <http://scottsdalearc.org>. Talk-in 147.180+ (PL 162.2). VE exams.

THOMASVILLE, GEORGIA — The Thomasville Amateur Radio Club will hold the **Great Southern Hamfest** Saturday, March 18 at the Exchange Club Fairgrounds, 2057 GA 122. Website: <http://thomasvilleamateurradioclub.com>.

ANNANDALE, VIRGINIA — The Vienna Wireless Society will hold the **Vienna Wireless Winterfest** Sunday, March 19 at the Northern Virginia Community College-Annandale Campus, 833 Little River Turnpike. Email: <winterfest2017@viennawireless.net>. Website: <http://viennawireless.net>. VE exams, card checking (until noon).

ROSENBERG, TEXAS — The Brazos Valley Amateur Radio Club will hold the **16th Annual Greater Houston Hamfest** Friday, March 24 and Saturday, March 25 at the Fort Bend County Fairgrounds, 4310 TX-36S. Website: <www.houstonhamfest.org>.

MT. VERNON, MISSOURI — The Ozarks Amateur Radio Society will hold its **Hamfest** Saturday, March 25 at the Mt. Vernon Arts and Recreation Center, 822 W. Mt. Vernon Boulevard. Contact: Mike Sanders, KØAZ, <k0az@centurytel.net> or Bob Myers <bhmyers@suddenlink.net>. Website: <www.w0oar.com>. Talk-in 146.970- (PL 162.2). VE exams.

LAS VEGAS, NEVADA — The Las Vegas Amateur Radio Club will host the **2017 ARRL Nevada State Convention** Friday, March 31 through Sunday, April 2 at the Eastside Cannery Casino & Hotel. Website: <http://nvcon.org> or <www.lvrac.org>. Talk-in 146.94 (PL 100). VE exams.

Photo J. Fernando, KP4MP, sending KOØZ an SSTV picture of his rig.

Photo K. Fernando, thanks for the SSTV QSO!

"P" number. Video referred to as a P5 denotes a "broadcast quality" image. The other reports on the scale are:

- P4 = typical quality with slight or minimal noise
- P3 = usable but somewhat noisy
- P2 = barely usable with lots of noise
- P1 = barely see the text
- P0 = unusable

For a more in-depth discussion of the "P" system of video quality reporting, see WB9KMW's "SSTV Reports Using the P Scale" elsewhere in this issue.

SSTV Transmission – Turn Down the Power!

Transmitting SSTV requires an interface between your computer and your rig's PTT switch and audio input. The SSTV website <http://hamsoft.ca/pages/mmsstv.php> offers suggested interfaces between the computer and the rig. Commercial interfaces such as there is from RigBlaster and MFJ also work well.

Photos need to be properly formatted for SSTV transmission. MMSSTV offers templates that allow you to customize yours. *Photo H* shows some of the templates that I've set up at my station.

Since CBS transmits in HD digital TV, our analog SSTV pictures are not even close in quality; nonetheless, analog SSTV does offer us a mode that allows us to see each other on the radio … worldwide!

Since SSTV is 100% duty cycle and final amplifier packages are expensive, I like to run my rig to 20% of its rated output. In other words, I set my transmitter power output to 20 watts instead of 100 watts. When I use my linear amplifier, I run it at 20% of its rated output.

It's also important to point out that the rig's speech processor needs to be

turned off. In addition, just like running SSB phone, it's important not to overdrive your rig's audio input. Check your ALC for proper signal levels.

You also need to synchronize the computer's sound card timing with MMSSTV settings to prevent slanted pictures on both transmit and receive. Not all computer sound cards have the same record and play frequencies. MMSSTV, in the help section, offers several ways to easily correct for slant. OK2MNM has a very good online SSTV handbook, <http://www.sstv-handbook.com>. Other good online sources include<http://www.hamuniverse.com/sstv.html> and WB9KMW's <http://bit.ly/2fFxZec>.

2-Meter SSTV

Did you know that the ISS (International Space Station) occasionally transmits SSTV on 145.800 MHz? It's true, periodically the ISS will send SSTV signals from orbit. In addition, back here on Earth, some clubs maintain 2-meter SSTV repeaters for photo exchanges. But you don't need a repeater … simplex frequencies can also be used between two stations. Wouldn't SSTV be a fun, exciting, mode to use with FM transceivers? Today's all-mode radios would not present a problem if you would like to use this image mode on VHF. Imagine two friends working on similar projects, such as a QRP (low power) transmitter, and exchanging progress pictures between each other using 6-, 2-meter, or 70-cm FM! They can, and you can, too, regardless of your license class or whether you're on HF or VHF.

See You on the Radio

It's been so long since I've been on SSTV that I find myself approaching this fascinating mode like it's my first time. I'm still "finding my way," but I'm having fun doing it and I'm making new friends along the way. Reporter Charles Osgood, former anchor of CBS News "Sunday Morning," ended his broadcast each week by saying, "I'll see you on the radio," referring to his weekday "Osgood File" program on CBS Radio. Since CBS transmits in HD digital TV, our analog SSTV pictures are not even close in quality; nonetheless, analog SSTV does offer us a mode that allows us to see each other on the radio … worldwide! Thank you for reading *CQ* and I'll see you on the radio!
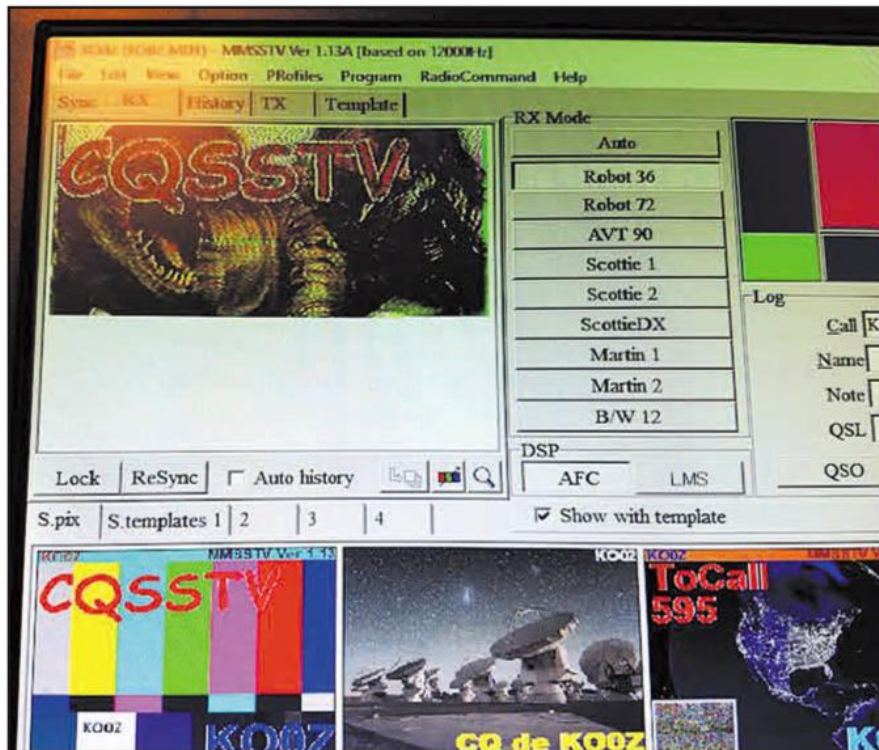
Photo L. CQ SSTV signal beginning to fill in the MMSSTV receive window.

Photo M. Completely received CQ SSTV picture from Steven, KM4OUS.

– 73 de Ron, KOØZ