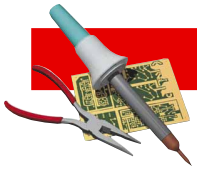


By Steve Ford, WB8IMY

TV on 10

The 10-meter band is paradise if you want to talk to the world with low power and small antennas. Why not swap pictures while you're at it?

Perhaps you haven't seen TV on the HF bands, but I'm willing to bet that you've heard it. Have you ever tuned your radio in the vicinity of 14.230 MHz, only to hear…

Squeeeeeeeeee…brrrrrrr…squee-squee-squee

…on and on for what seems like a couple of minutes? That's a slow scan television (SSTV) signal. The station isn't sending a moving image. Instead, the operator is transmitting a still photograph (think fax, but in color).

Slow scan is *not* a new operating mode. In fact, it has been around for about 40 years. What *is* new is how easy SSTV has become for the average ham. In the "good old days" of SSTV, you needed specialized equipment such as monitors with long-persistence phosphor screens. The SSTV image would slowly "paint" onto these pale yellow or amber screens from top to bottom. Of course, the top of the image would be fading just as the bottom was completed. It was an amazing thing to see in its day, but we've come a long way since then.

What's the Big Deal About 10 Meters?

Most SSTV takes place on 20 meters, at or near 14.230 MHz. This has been true for decades. So why am I focusing on 10-meter SSTV?

SSTV is relatively simple from a hardware and software standpoint, thanks to personal computers. All you need to set up an SSTV station is an HF SSB transceiver and a computer equipped with a sound card. And 20-meters is a great place to "cut your teeth" on this mode (you'll find someone sending SSTV on 14.230 MHz at just about any time of day).

But…

Many amateurs are forced to operate under severe antenna restrictions. A 33-foot dipole antenna for 20 meters may not be feasible, especially if you live in an apartment or condominium. On the other hand, a 16-foot hank of wire for 10 meters, strung "creatively," is easier to accommodate. Such an antenna can fit in an attic, along a ceiling, among the clapboards and so on.

Twenty meters can become an awfully crowded band.

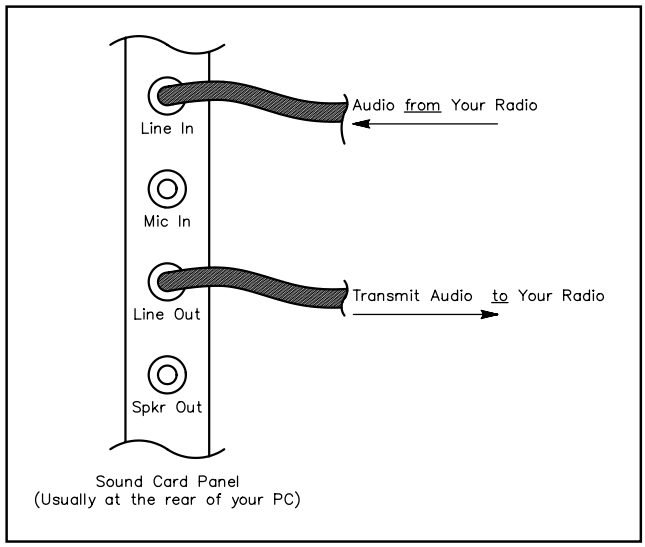
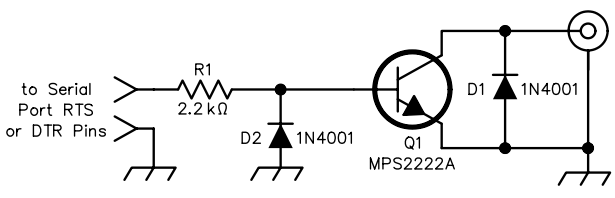


Figure 1—Connecting your sound card to your transceiver is relatively easy. You may need to use 1:1 isolation transformers in the audio lines if you experience hum in the transmit or receive signals.

SSTV Sound Card Software on the Web

ChromaPIX: www.siliconpixels.com
MMSSTV: www.geocities.com/mmhamsoft/
MSCAN: mscan.com/
W95SSTV: www.siliconpixels.com
WinPix32: www.skypoint.com/~k0heo/
Blaster SSTV (DOS, for slower PCs): www.hampubs.com/sstvwith.htm
QSSTV (for *Linux*): home.tiscalinet.be/on1mh_ham/
Multimode (for Macs): www.blackcatsystems.com/software/multimode.html



Serial Port Pin - Out

	DB25	DB9
RTS	4	7
DTR	20	4
GND	7	5

Figure 2—This simple circuit can be used to key your radio into the transmit mode from your computer's serial (COM) port.

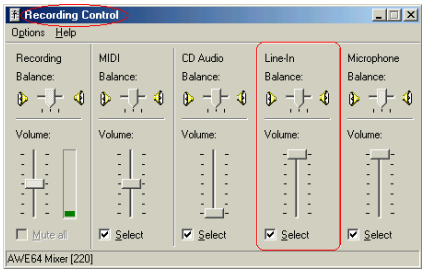
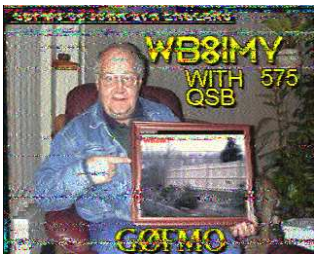


Figure 3—This is a typical sound card "mixer" window. Note that to adjust the *incoming* audio for the sound card, you must use the RECORDING controls. In this example, the line input (circled in red) is enabled and the gain is set to maximum.

Figure 4—If you see an image like this, you need to adjust your *slant* (see text).



G0FMO and I exchanged images on 10 meters using just 10 W. The image from England is noisy, but viewable. He is pointing to a copy of the image of my back yard that I just sent to him!

Not everyone you encounter on 10 meter SSTV is DX...

Weak-signal SSTV on 10 meters! This image was copied from DH2SAQ at 6:30 AM my local time. The signal audio was weak and the S meter was reading zero.

Interference is the order of the day and it often takes serious RF muscle to cut through the cacophony. Ten meters, in contrast, is like a wide-open prairie with room to roam. Better still, you don't need enormous amounts of power for global SSTV propagation. I've consistently worked SSTV on 10 meters with just 25 W. That's one of the attractions of 10 meters, as any veteran of the band will tell you.

The SSTV gathering place on 10 meters is 28.680 MHz, plus or minus 10 kHz. This is where you'll find DX SSTV, especially in the morning and early afternoon, local time. On 20 meters, operators often come together in groups (*nets*) to exchange SSTV images. On 10 meters, the emphasis is more on random, individual contacts. There is not a great deal of chitchat between 10-meter SSTV exchanges; usually no verbal conversation takes place at all. Because you're dealing primarily with international contacts, many of these operators do not speak fluent English—they prefer to let their images do the "talking." Their images frequently contain short English text greetings such as "good morning," or brief descriptions of the scene ("My home by the sea").

Setting Up for SSTV

To send an image over the HF airwaves, you need to convert the picture into audio tones that carry the necessary image information. Your station PC is ideally suited for this task. As long as it is a Pentium-class computer (a 100-MHz Pentium or faster) containing a sound card, you'll be able to use just about any SSTV software that's available today. (There is also SSTV software available for Macintosh and *Linux* platforms.) The SSTV software will do the image processing and your sound card will handle the chore of converting data to audio (and vice versa). See the sidebar "SSTV Software on the Web."

You can connect your PC sound card to your transceiver as shown in Figure 1. I prefer to use my rig's accessory jack to gain access to the receive and transmit audio connections. If your radio does not have such a jack, you can connect the transmit audio through your microphone connector and tap the receive audio at the external speaker jack.

I use my computer's COM port to place my radio in the transmit mode using the circuit shown in Figure 2. A more elegant solution is to bring all of your interfacing together with a single, dedicated unit such as the RIGBlaster from West Mountain Radio (18 Sheehan Ave, Norwalk, CT; tel 203-853-8080; www.westmountainradio.com). If you don't feel like soldering your own computer-to-radio interface circuitry, the RIGBlaster is definitely the way to go.

Whichever approach you use, make sure that you've set up the proper audio levels. You'll need enough receive audio for the sound card to process—and you'll need to make sure that the audio makes it to the sound card in the first place. Check your sound card audio mixer settings (see Figure 3). You want to view the **RECORD** settings at this point. Is the line or microphone input enabled and the "pot" turned all the way up?

When transmitting, adjust your **PLAYBACK** audio to avoid overdriving your radio. As a rule of thumb, increase the playback audio output until you see your radio's ALC meter/indicator begin to activate. Then, reduce the level slightly.

Scottie Who?

After you've loaded and configured your SSTV software, try to receive some images. You can try your luck on 10 meters to see what the band has in store, or fire up on 20 meters for a quick test. Just put your radio into the upper sideband mode and have at it.

Chances are, the first images you receive are going to look pretty awful! There are at least three reasons for this: *format*, *tuning* and *slant*.

SSTV operators use quite a variety of image transmission formats, depending on the application (more than 35 at last count). Most amateurs in the United States and Canada seem to prefer "Scottie 1." Much of the rest of the world uses a format known as "Martin 1." If you attempt to receive, say, a Martin 1 transmission using the Scottie 1 format, the result

Nils, SM5EEP, sent this image of his home in Sweden.

Another S-0 10-meter image, this time from Russia. Victor and I exchanged several images in the early morning before I had to drive off to work!

will resemble a Jackson Pollock painting on a bad day.

Seasoned SSTV operators can tell the difference between the two formats by the sounds of their respective signals. Even so, the custom is to announce the format before you begin sending the image ("Here comes the next photo. Scottie 1."). On 10 meters, however, such announcements are not common. Fortunately, most SSTV programs include the ability to identify the formats automatically. If automatic identification doesn't work, try switching formats manually. If you're receiving a DX signal, assume it is Martin 1—at least at first.

Just about every SSTV program I've seen so far includes some kind of tuning indicator. The first thing you need to learn is how to use it. Even if you have the correct format selected, you'll see nothing sane unless you have the signal tuned properly. Be patient with yourself; this takes time to master. Most tuning indicators mark where the 1200-Hz sync pulse should be. My personal technique is to tune the radio until I see the sharp spike of the sync pulse hovering right over that mark. In time you'll discover which method works for you, then it'll become second nature.

You have the signal tuned properly, and the correct format selected, but the image *still* looks hideous. Now what? If the picture appears slanted as shown in Figure 4, you need to make some fine adjustments to straighten everything out. Every pro-

A Slow-Scan TV Glossary

ATV—Amateur Television. Sending pictures by Amateur Radio. You'd expect this abbreviation to apply equally to fast-scan television (FSTV), slow-scan television (SSTV) and facsimile (fax), but it's generally applied only to FSTV.

AVT—Amiga Video Transceiver. (1) Interface and software for use with an Amiga computer, developed by Ben Blish-Williams, AA7AS, and manufactured by Advanced Electronic Applications (AEA); (2) a family of transmission modes first introduced with the AVT product.

Back porch—The blank part of a scan line immediately following the horizontal sync pulse.

Chrominance—The color component of a video signal. NTSC and PAL transmit color images as a black-and-white compatible luminance signal along with a color subcarrier. The subcarrier phase represents the hue and the subcarrier's amplitude is the saturation. Robot color modes transmit pixel values as luminance (Y) and chrominance (R-Y [red minus luminance] and B-Y [blue minus luminance]) rather than RGB (red, green, blue).

Demodulator—For SSTV, a device that extracts image and sync information from an audio signal.

Field—Collection of top to bottom scan lines. When interlaced, a field does not contain adjacent scan lines and there is more than one field per frame.

Frame—One complete scanned image. The Robot 36-second color mode has 240 lines per frame. NTSC has 525 lines per frame with about 483 usable after subtracting vertical sync and a few lines at the top containing various information.

Frame Sequential—A method of color SSTV transmission which sent complete, sequential frames of red, then green and blue. Now obsolete.

Front porch—The blank part of a scan line just before the horizontal sync.

FSTV—Fast-Scan TV. Same as common, full-color, motion commercial broadcast TV.

Interlace—Scan line ordering other than the usual sequential top to bottom. For example, NTSC sends a field with just the even lines in 1/60 second, then a field with just the odd lines in 1/60 second. This results in a complete frame 30 times a second. AVT "QRM" mode is the only SSTV mode that uses interlacing.

Line Sequential—A method of color SSTV transmission that sends red, green, and blue information for *each sequential scan line.* This approach allows full-color images to be viewed during reception.

Luminance—The brightness component of a video signal. Usually computed as Y (the luminance signal) = 0.59 G (green) + 0.30 R (red) + 0.11 B (blue).

Martin—A family of amateur SSTV transmission modes developed by Martin Emmerson, G3OQD, in England.

NTSC—National Television System Committee. Television standard used in North America and Japan.

PAL—Phase alteration line. Television standard used in Germany and many other parts of Europe.

Pixel—Picture element. The dots that make up images on a computer's monitor.

P7 monitor—SSTV display using a CRT having a very-long-persistence phosphor.

RGB—Red, Green, Blue. One of the models used to represent colors. Due to the characteristics of the human eye, most colors can be simulated by various blends of red, green, and blue light.

Robot—(1) Abbreviation for Robot 1200C scan converter; (2) a family of SSTV transmission modes introduced with the 1200C.

Scan converter—A device that converts one TV standard to another. For example, the Robot 1200C converts SSTV to and from FSTV.

Scottie—A family of amateur SSTV transmission modes developed by Eddie Murphy, GM3SBC, in Scotland.

SECAM—Sequential color and memory. Television standard used in France and the Commonwealth of Independent States.

SSTV—Slow Scan Television. Sending still images by means of audio tones on the MF/HF bands using transmission times of a few seconds to a few minutes.

Sync—That part of a TV signal that indicates the beginning of a frame (vertical sync) or the beginning of a scan line (horizontal sync).

VIS—Vertical Interval Signaling. Digital encoding of the transmission mode in the vertical sync portion of an SSTV image. This allows the receiver of a picture to automatically select the proper mode. This was introduced as part of the Robot modes and is now used by all SSTV software designers.

Wraase—A family of amateur SSTV transmission modes first introduced with the Wraase SC-1 scan converter developed by Volker Wraase, DL2RZ, of Wraase Electronik, Germany.

Table 1
SSTV Modes

Group	*Name*	*Color*	*Transmission Time (sec)*	*Scan Lines*
AVT	24	RGB	24	120
	90	RGB	90	240
	94	RGB	94	200
	188	RGB	188	400
	125	BW	125	400
Martin	M1	RGB	114	240
	M2	RGB	58	240
	M3	RGB	57	120
	M4	RGB	29	120
	HQ1	YC	90	240
	HQ2	YC	112	240
Pasokon	P3	RGB	203	16+480
	P5	RGB	305	16+480
	P7	RGB	406	16+480
	PD 240	YC	248	480
	PD 180	YC	187	480
	PD 160	YC	161	384
	PD 120	YC	126	480
	PD 90	YC	90	240
Robot	12	YC	12	120
	24	YC	24	120
	36	YC	36	240
	72	YC	72	240
Scottie	S1	RGB	110	240
	S2	RGB	71	240
	S3	RGB	55	120
	S4	RGB	36	120
	DX	RGB	269	240
Wraase SC-1	24	RGB	24	120c
	48	RGB	48	240
	96	RGB	96	240
Wraase SC-2	30	RGB	30	128
	60	RGB	60	256
	120	RGB	120	256
	80	RGB	180	256

Color Type:
RGB—Red, Green and Blue components sent separately.
YC—Sent as Luminance (Y) and Chrominance (R-Y and B-Y).
BW—Black and White

gram includes a slant adjustment. Tweak this adjustment while receiving a number of images. Once again, be patient. It's easy to over-correct. The goal is to have a display with perfectly vertical edges on each side. The good news is that after you've adjusted the slant to your satisfaction, you may never need to do it again unless you install a new sound card. Just don't forget to save your slant settings when you're done (some programs *do not* remind you to do so!).

But What do I Send?

You need to create a collection of treasured images! There are a number of ways to do this:

- Buy or borrow a digital camera and start snapping photos of everything in sight: Yourself, your cat, your irate neighbors, whatever strikes your fancy. You do not need to invest in a multi-megapixel camera with every feature known to man. Even a cheapie (less than $100) digital camera is fine for grabbing images for your SSTV vault.
- Buy or borrow a flatbed scanner and scan everything in sight.
- Take a pile of photo prints to your local photo processor and ask them to scan the pictures to disk for you in either JPG or BMP format. Many outlets now provide this service.

Once the images are safely housed on your hard drive, your SSTV software can grab them at will. This will allow you to share the image of your new motorized fertilizer spreader with an amateur in, say, Greenland.

It helps to add text to your images to explain what you are attempting to show. (The function of a fertilizer spreader may not be immediately obvious to an amateur in Greenland.) Most SSTV programs have accessory functions that allow you to add text. Don't get carried away, though. SSTV images are small, so use large lettering. Don't try to squeeze your latest quantum theory of gravity into the lower right corner.

Remember that many of your contacts on 10 meters may understand little or no English. Use your image text to communicate in simple terms. For example: "UR 595 in Chicago, Illinois. Name is Dave." Your partner may want to chat with you verbally between images, but have some "non-verbal" backups in your collection just in case.

Enjoy!

SSTV is a hoot no matter what band you're on. There is something almost magical about receiving a picture from another country, thousands of miles from where you call home. It seems to happen to me more often on 10 meters, and usually when I least expect it. The band may seem utterly dead when, without warning, I'll hear the high-pitched song of an SSTV signal reaching my meager antenna from the other side of the world.

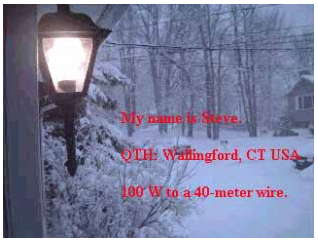
Yes, noise and fading sometimes mar the images, but each one remains a wonder. I've viewed endless vistas of Russian winters; lush tropical jungles of Brazil; railroad stations in the mountains of northern Norway and glorious scenes of Paris in the spring. All of these and many more have come floating in on the 10-meter airwaves. Best of all, I'm often treated to pictures of the person on the other end of the circuit, along with their homes and families. It gives you a genuine "human" perspective that is difficult to enjoy with almost any other mode.

Twenty-meters is the traditional SSTV "homeland," but 10-meter slow scan may be one of our best-kept secrets. Load the software and tune to 28.680 MHz. You may be surprised at what you hear…and *see*.

Something Looks Familiar...

I can hear the HF digital readers saying, "Wait a minute! This article is describing an computer/radio interface for PSK31 [or RTTY, or MFSK16, or Hellschreiber…]!"

Bingo! You win the prize. SSTV with your computer sound card uses *exactly* the same interface employed for the HF digital modes. If you're already HF digital-active, all you need to run SSTV is the software. Download the program, install it and you've just added a new mode to your station repertoire.



I often use this snowy image (taken in front of my home) to begin the SSTV "conversation."

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