Soundcard TNC Utility for APRS-SCS

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Introduction

AX.25-SCS01-DS-FD.exe (SCS01) is a soundcard TNC utility for John Blowsky's (KB2SCS) APRS-SCS APRS[1] program. SCS01 interfaces APRS-SCS through the PC's TCP/IP stack using the stack's internal loopback address (127.0.0.1) on port 4000. Packets are passed between APRS-SCS and SCS01 in KISS format. SCS01 utilizes Microsoft's DirectSound (DirectX) technology to pass data to and from the PC's soundcard. SCS01 uses DSP methods to modulate and demodulate standard AX.25 FSK signals at 1200 b/s and 300 b/s.

SCS01 has been tested on PCs running Windows XP and Windows 98. Either the runtime version or the SDK for DirectX (9.0 or later) must be installed for SCS01 to operate. XP appears to ship with DirectX installed, Windows 98 does not. In any event, you can go to Microsoft's website to download the latest version of DirectX. To install AX.25-SCS01-DS-FD.exe, simply put this file in a convenient folder and create and place a shortcut for it on your desktop next to the APRS-SCS shortcut.

For details of the design techniques used in SCS01, see my paper in the 2003 DCC Conference Proceedings[2]. Please note SCS01 is experimental software offered strictly on an AS IS basis.

SCS01 Program Operation

When SCS01 starts, a dialog box is presented to let you either *Activate APRS-SCS Support* or *Cancel APRS-SCS Support*, as shown if Figure 1. If you just want to monitor AX.25 traffic without running APRS-SCS (Figure 2), click on *Cancel APRS-SCS Support*. To support APRS-SCS operation, click on *Activate APRS-SCS Support* and then start APRS-SCS. Next, click on *Sound Card* in the *Ports* Menu of APRS-SCS as shown in Figure 3. SCS01 will then send KISS packets to APRS-SCS for display, as shown in Figure 4. Be sure to exit SCS01 and then APRS-SCS when you end a session.

SCS01 has three menus, *File*, *View* and *Mode*. The *File* menu contains *New*, *Open*, *Save*, *Save As*, a list of files, and *Exit*. Basically conventional Windows file support for the screen text. The *View* menu contains the following items: *Clear Text*, *Demodulator Output*, which is the default scope display showing the output of the FSK demodulator (Figure 5), *Demodulator Vector Amplitude* which shows the vector amplitude of the FSK signal into the demodulator, and *Input FFT and Waveform*, which shows the FFT of the input signal on the left and the time waveform on the right. The *Mode* menu allows you to choose either *300 b/s AX.25* or *1200 b/s AX.25* (default). Under the *Mode* menu you can also choose *RX Audio* which allows you to listen to the input audio, albeit somewhat delayed, and *Enable SCS TX*, which allows transmission of KISS packets received from APRS-SCS by SCS01 (see below).
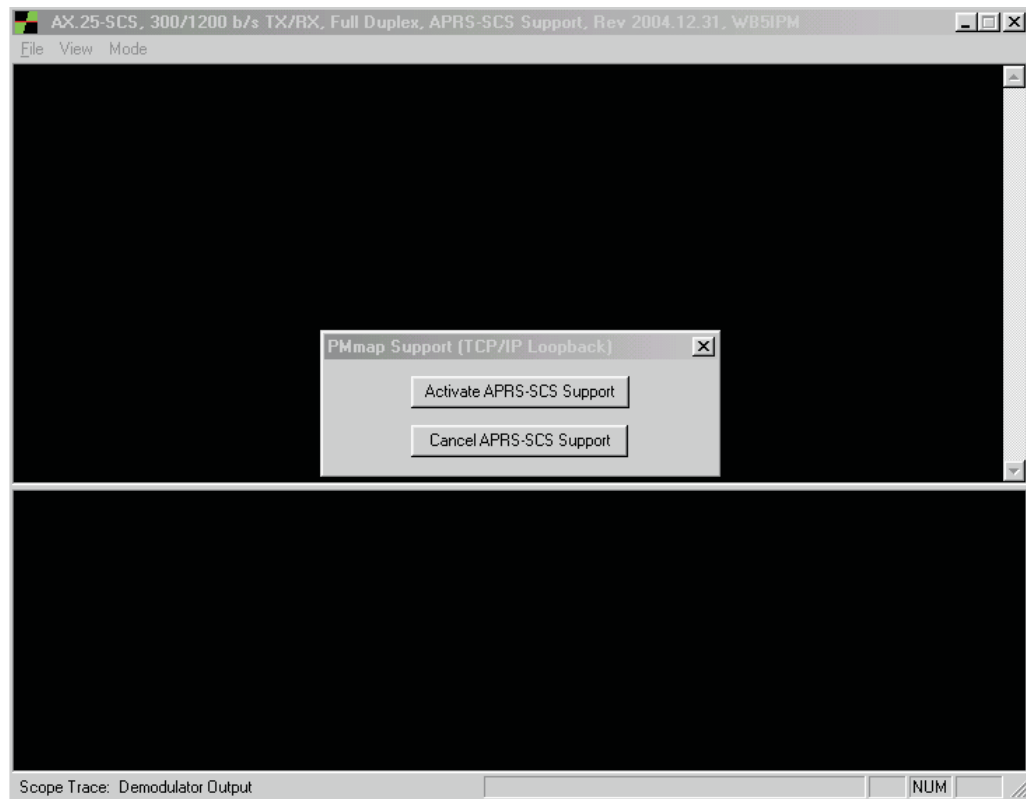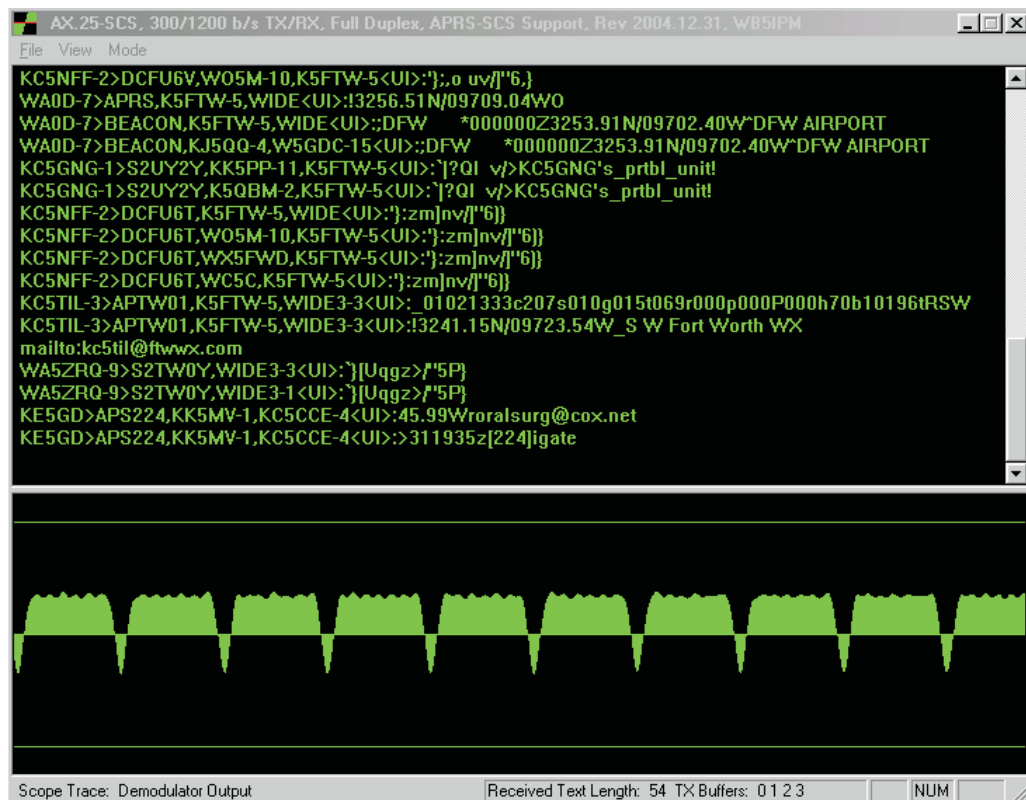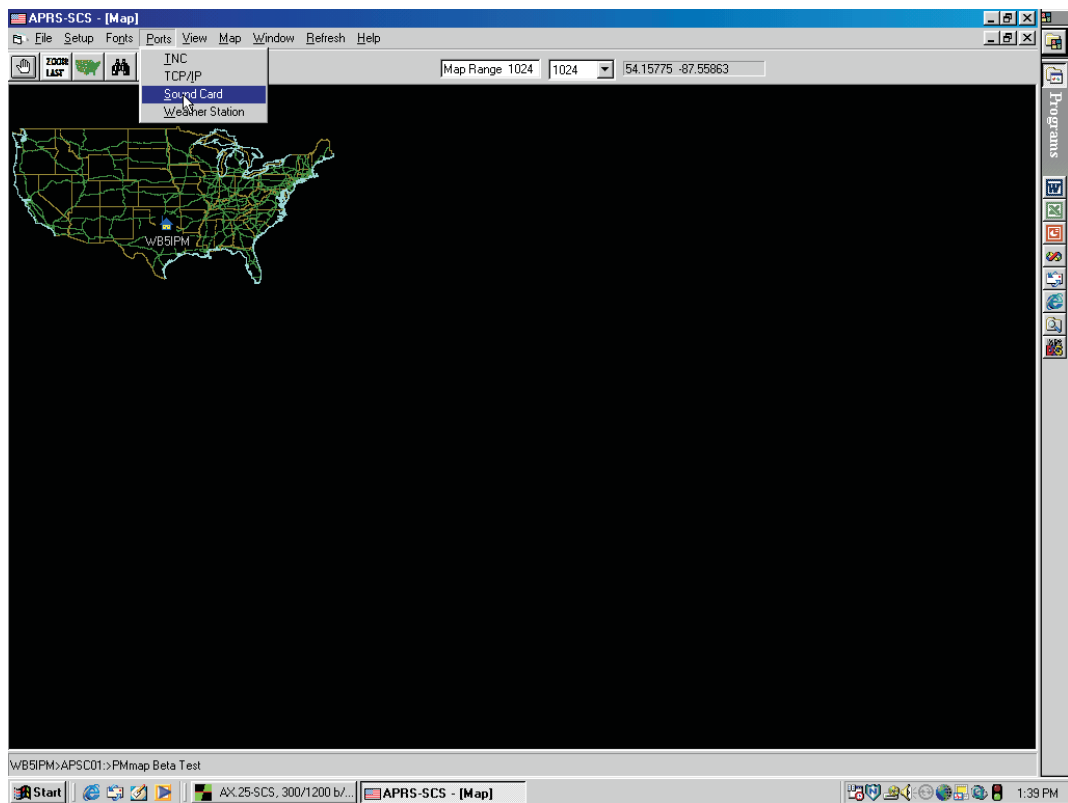
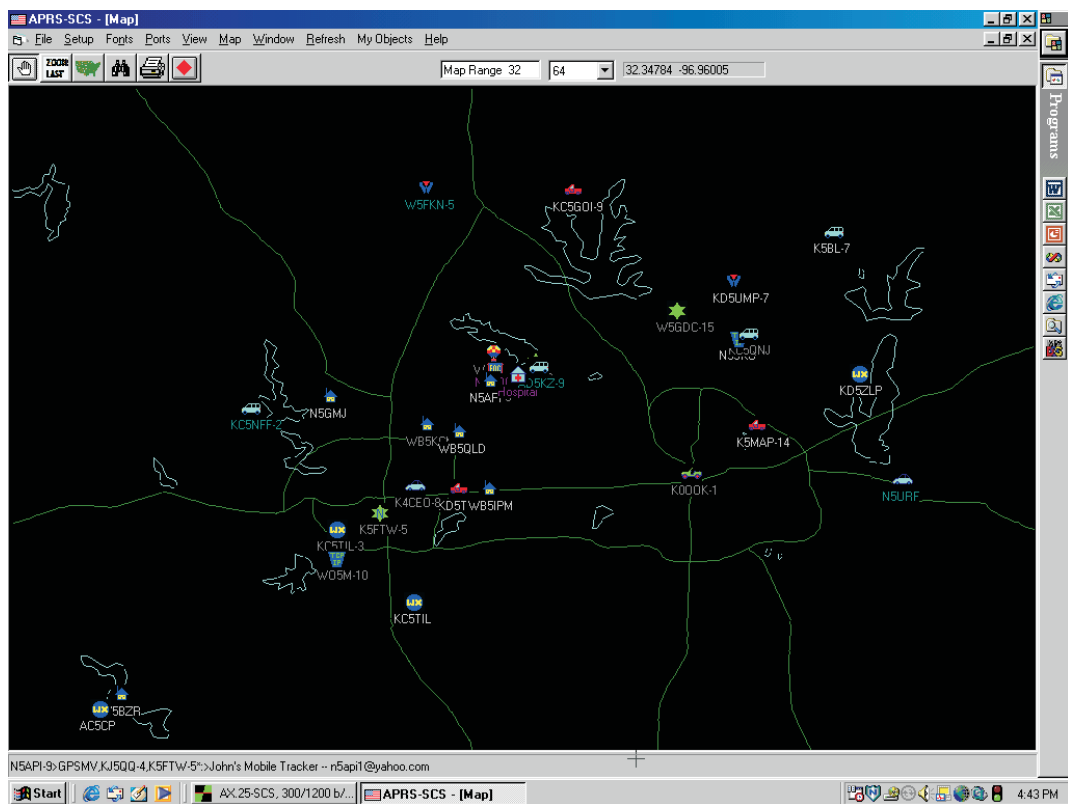**Figure 1**
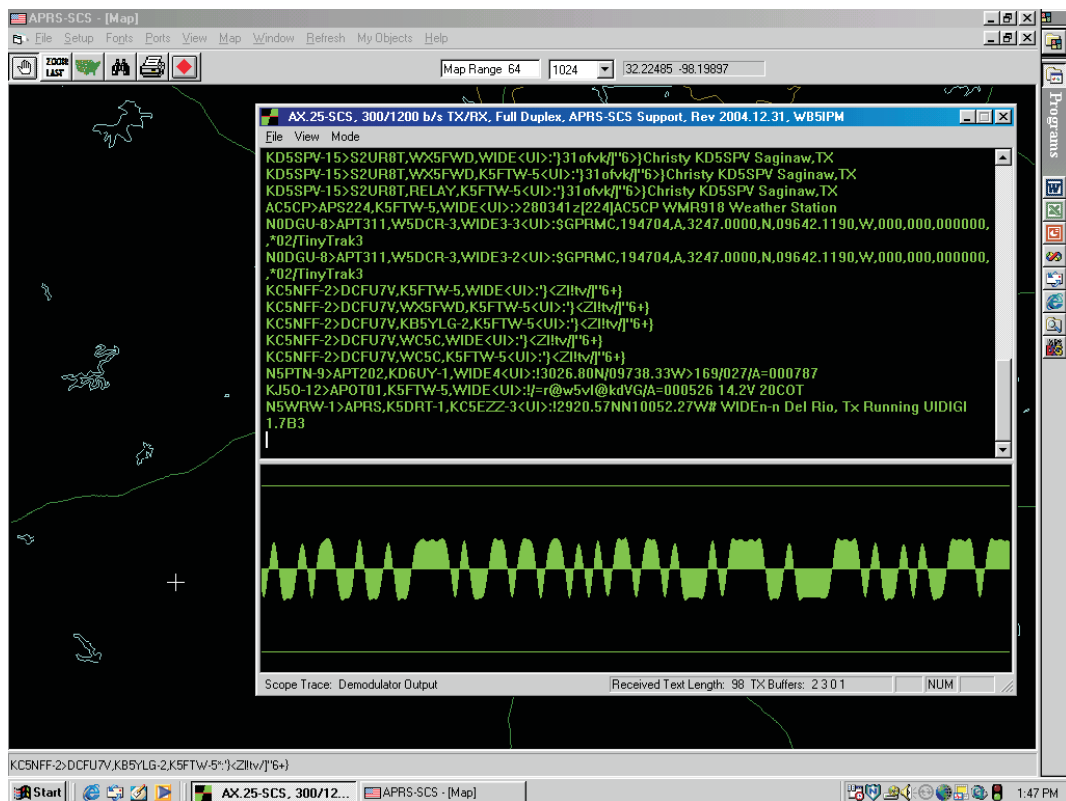

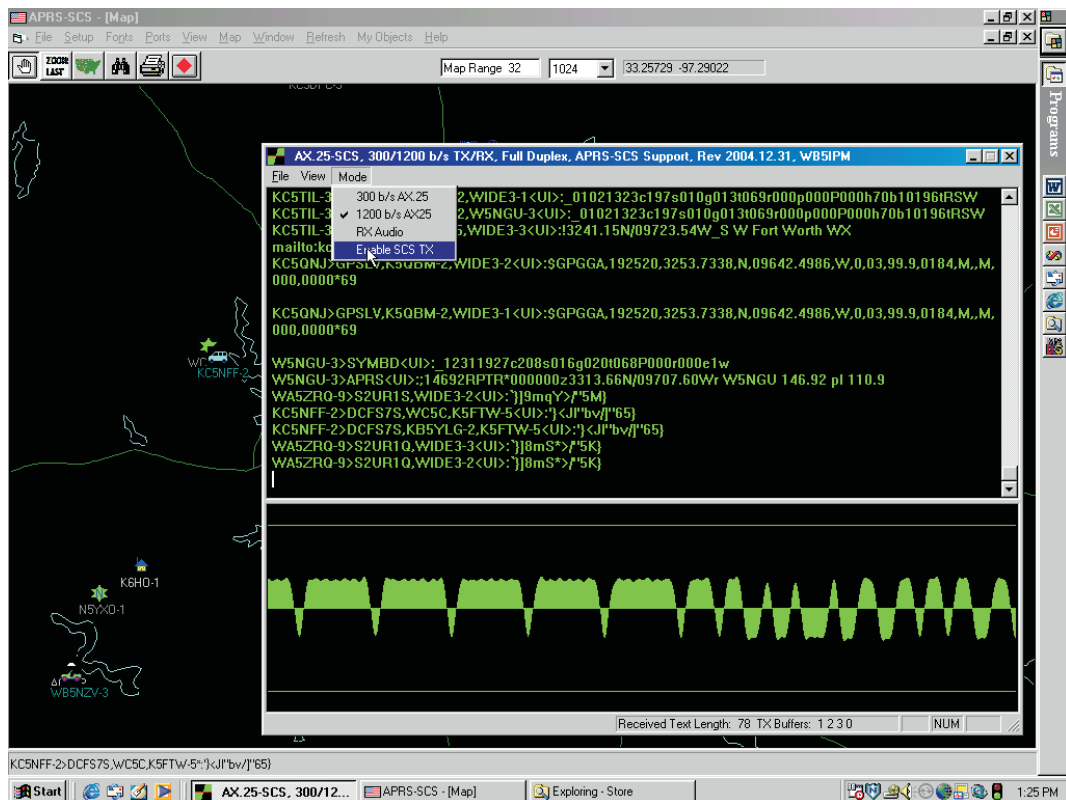**Figure 2**

Figure 3

Figure 4

Figure 5

Figure 6

Tuning 300 b/s AX.25 on HF (SSB) can be a bit tricky. I start by choosing the *Input FFT and Waveform* from the *View* menu and centering the signal between the tick marks on the FFT display. I then switch to the *Demodulator Output* display mode and fine tune my HF rig so that the red "adaptive threshold" line sits on top of the middle green line while a packet is being received (the red line tends to drift up between packets). The adaptive threshold is handy for HF packet monitoring, as there is often some difference in frequency between stations in an HF packet QSO.

The *Demodulator Vector Amplitude* gives an interesting insight into the amplitude balance between the two FSK tones. I have seen many transmissions that have a 2:1, 3:1, or even higher tone unbalance.

To enable SCS01 to transmit APRS-SCS packets, click on the *Mode* menu, be sure *RX Audio* is off and then *Enable SCS TX* (Figure 6). PTT is by VOX. On air opeation at WB5IPM has been with an ICOM 706MKIIG and a RIGblaster interface between the PC soundcard and the '706. I get the best results with the VOX gain set around 8 and the VOX delay set around 0.2. Be careful with the VOX settings to avoid false or unstable transmsitter keying. Note that SCS01 will hold off transmitting if it is receiving an audio signal (including noise), so you need to squelch out the noise between packets on your receiver.

Notes

[1]APRS is a registered trademark of Bob Bruninga, WB4APR.

[2]F. Perkins, WB5IPM, "DSP Programming using DirectSound and MFC/VC++,", *Proceedings of the 22nd ARRL and TAPR Digital Communications Conference*, Hartford, Connecticut, September 2003, pp 140-149.