

# SOUND CARD BASICS

for MARS Stations

**THE USE OF SOUND CARD MODES IS EXPANDING RAPIDLY THROUGHOUT NAVMARCORMARS. THESE MODES ARE PROVING TO BE EFFICIENT IN MESSAGE HANDLING AND INEXPENSIVE TO OPERATE, ELIMINATING THE NEED FOR AN EXPENSIVE MULTI-MODE TERMINAL NODE CONTROLLER (TNC).**

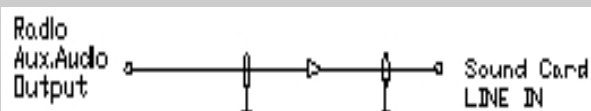
If you want to get involved in sound card digital radio, you've come to the right place (at least one of them). Trust me; it's not nearly as complicated as it sounds. Here how to get started quickly and easily. If you have a computer with a sound card and an extra ten bucks or so, you're ready to go.

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For sound card modes your computer's sound card performs as a modem for transmitting and receiving digital data. Audio output from your transceiver, is sent to your computer soundcard where it is processed to a readable format. Output data from your computer's keyboard (and/or files) is processed by the computer and sent as audio from your sound card's speaker jack to the MIC input of your transmitter.

To accomplish this you will need an interface between your radio (transceiver) and your computer's sound card. The function of the interface is to take received speaker audio from the radio to the sound card Line-IN jack (or MIC if no Line-In jack is available), and then take audio from the sound card Line Out (or speaker) to the radio's microphone circuits. In addition you will need a means to key the radio either manually or incorporated within the interface.

**NO ELABORATE INTERFACE IS NEEDED** for receive only. To just receive, you'll need a shielded audio cable with the appropriate ends, to take your received audio from your transceiver to the sound card to the computer 'line-in' or 'mic' jack.



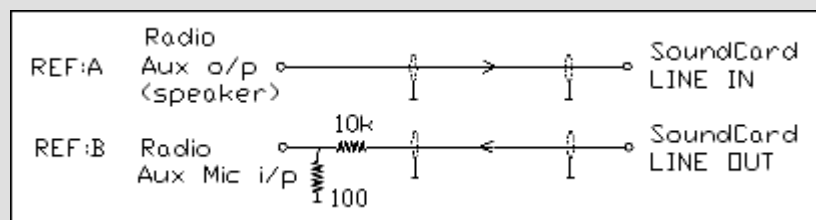
**A 1:1 audio transformer (such as Radio Shack #273-1374) is recommended in the line to avoid any ground loops or DC current in the line.**

Just set things up in a manner that suits your particular situation. For example;

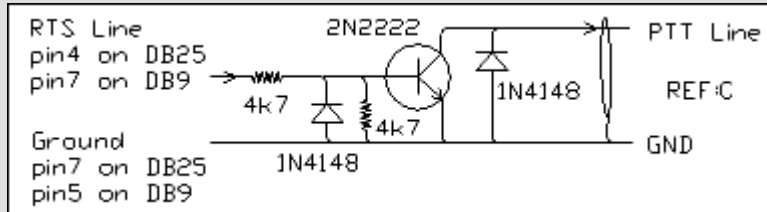
- If you use an external speaker, you might just add a "Y" connector (splitter) at your speaker jack and go from one side to your speaker and the other to the sound card 'Line In' (or 'mic' if there is no 'line in' jack).
- Alternately, you can go from your radio's external speaker jack to the sound card 'line in' or 'mic' jack and listen to your radio through your computer speakers.
- You can use, depending on your rig, the accessory connector in the rear of the transceiver as the audio source. Audio from this jack is often at a constant level and is unaffected by the gain setting. This works well for sound card work and eliminates the need to constantly adjust your sound card levels.

**Sound card interface units can be built inexpensively or purchased as kits or assembled units.**

Below is a simple circuit that I have used (with manual PTT) for all soundcard modes and with various rigs. **A 1:1 audio transformer, as mentioned above, is recommended for each line to avoid ground loops and possible damage from DC current.**



A simple PTT circuit such as shown below will allow the software to key your transceiver.



There are many approaches to interfacing your radio and computer.

Here is an excellent site that covers the interface subject if you want to build your own interface. A web search will yield many more ideas, circuit sources, and commercial interfaces. Don't forget to check your digital software help files for interface information.

<http://www.qsl.net/wm2u/interface.html>

Many will find the convenience offered by commercial interface units beneficial. Currently there many units available in kit and assembled versions and can be located in Amateur radio publications or on the internet. Remember to keep it simple, and you do not need to spend lots to obtain excellent results. My particular set up cost just a few dollars and has worked flawlessly for several years on all sound-card modes.

## Sound-Card Digital Modes:

Listed here are but a few of the sound card modes, concentrating on the ones of possible interest to the MARS operator.

MODE	DESCRIPTION	ADD'NL INFO LINKS
MT63	MT63 is a DSP based advanced HF mode for Amateur Radio, intended to provide high performance keyboard - to - keyboard operation	<a href="#">MT63</a>

	<p>on HF bands under poor conditions. MT63 utilizes a number of revolutionary ideas, and is technically very complex. MT63 is no more difficult to operate than RTTY, and is easy to tune. It also provides much better performance on HF than most other modes.</p> <p>The specialty of MT63 is its performance when conditions are both weak and unstable. It also copes with incredible QRM.</p> <p><i>Murry Greenman ZL1BPU</i></p> <p>MT-63 is now the standard mode used for transmission of SCD (Single Channel Data) net traffic in Alabama (and many other States and Regions).</p> <p>MT-63 operation far exceeds AMTOR in both speed and accuracy, especially under adverse conditions.</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;"><b><u>Page</u></b></div> <p style="text-align: center;"><a href="#"><u>MT63 - WM2U</u></a></p> <p style="text-align: center;"><a href="#"><u>NAVMARCOMARS</u></a></p>
<b>WINMOR</b>	<p>WINMOR is a soundcard application allowing access to the <a href="#"><u>Winlink 2000 (WL2K)</u></a> system using your PC and soundcard rather than a more expensive TNC.</p>	<p style="text-align: center;"><a href="#"><u>Winlink 2000 (WL2K)</u></a></p>
<b>PACTOR FEC</b>	<p>Pactor ARQ is used with the Winlink 2000 (WL2K) system. Pactor FEC would be suitable for broadcast mode traffic transmission, but generally on MARS nets MT-63 is used instead.</p> <p><b>Currently I know of no software supporting Pactor ARQ. At one time Brian Beezley, K6STI, offered a DOS based sound card program called 'RITTY' which reportedly would do Pactor ARQ. RITTY required a TRUE Sound Blaster sound card and, I am told, would NOT run on the vast majority of</b></p>	<p style="text-align: center;"><a href="#"><u>AIRMAIL 2000</u></a></p> <p style="text-align: center;">also see NTP-8 (c) p.960</p>

	<p>sound card clones. I am not sure that it is still supported, and the last license fee I heard was around the cost of a good used TNC.</p>	
<p><b>AMTOR FEC</b></p>	<p>Although, Alabama has changed to <u>MT63</u> as the standard/perferred method of transmitting general messages, Amtor is still a viable mode for Alabama nets,</p> <p>Although we transmit EEI messages by voice during ECOM exercises, in an actual event digital transmission is much more efficient and accurate.</p> <p>Prior to sound card technology, an expensive modem was required to decode received AMTOR FEC. Now your computer's sound card can do the job. If your computer does not have a sound card, you can add one at little cost. Ask around, and someone will likely have an extra one that you can have, and even a new card is very cheap. Virtually any sound card will work. You don't need the latest/greatest super-duper game card.</p> <p>Currently there is not, to my knowledge, any sound card software supporting AMTOR ARQ and you are encouraged to procure a TNC for MDS operation of AMTOR ARQ.</p>	<p><a href="#">ARRL Articles</a></p> <p><a href="#">NTP-8(d), p 930, 940</a></p> <p><a href="#">AMTOR SOFTWARE</a></p>
<p><b>ALE</b></p>	<p><u>Automatic Link Establishment</u> is being utilized more in MARS operation with the introduction of MARS-ALE.</p> <p>The primary purpose of ALE is to provide a much more reliable means for one station to call another station via HF radio. MARS-Ale soundcard software</p>	<div data-bbox="1045 1577 1330 1692" style="border: 1px solid black; padding: 5px; text-align: center;"> <p><a href="#">ALE Page</a></p> </div>

	<p>further expands ALE as a messaging tool.</p>	
SSTV	<p>Slow Scan TV is the transmission of still images via RF. While not commonly used in MARS it could be, and has been, a valuable mode to transmit disaster pictures via radio.</p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <a href="#"><u>SSTV Page</u></a> </div>
<p><b>PSK31</b> (BPSK and QPSK)</p>	<p>PSK31 is the mode that really sparked a general interest in sound card communication modes.</p> <p>PSK31 is based on an idea by SP9VRC and developed by Peter Martinez, G3PLX, who also developed AMTOR. Based on RTTY, PSK is used for live keyboard-to-keyboard QSOs at 50 WPM (31 Baud) and uses "Phase Shift Keying" to signal mark and space values, instead of changing the frequency like RTTY (FSK).</p> <p>PSK31 operates in a very narrow bandwidth allowing several individual, non-interfering, QSOs to simultaneously occupy one 3000 Hz bandwidth allocation. PSK31 is very effective with low power and QPSK improves communication under some adverse band conditions.</p> <p>For MARS purposes, these features are offset by PSK31 being relatively slow, and having no real forward error correction (FEC) features.</p> <p>In addition to BPSK and QPSK there are several variations to PSK31, but are beyond the scope of this article.</p>	<p><a href="#"><u>PSK31 HOMEPAGE</u></a></p> <p><a href="#"><u>WM2U - PSK31</u></a></p> <p><a href="#"><u>Getting Started with Digipan</u></a></p>
MFSK	<p>MFSK is a technique for transmitting digital data using multiple tones, extending the RTTY two tone technique to many tones, usually, but</p>	<p><a href="#"><u>MFSK - WM2U</u></a></p>



<a href="#">MMTY</a>	F								Y						
<a href="#">MMSSTV</a>	F										Y				
<a href="#">Digipan</a>	F			Y											
<a href="#">WinWarbler</a>	F			Y					Y						
<a href="#">Logger32</a>	F			Y					Y					Y	

F=Freeware, S=Shareware, C=Commercial

(a) <http://www.mixw.net/>  
(b) <http://www.dxsoft.com/>

## Other Sound Card Software Sources

(Check these sites often as new programs and updates occur frequently)

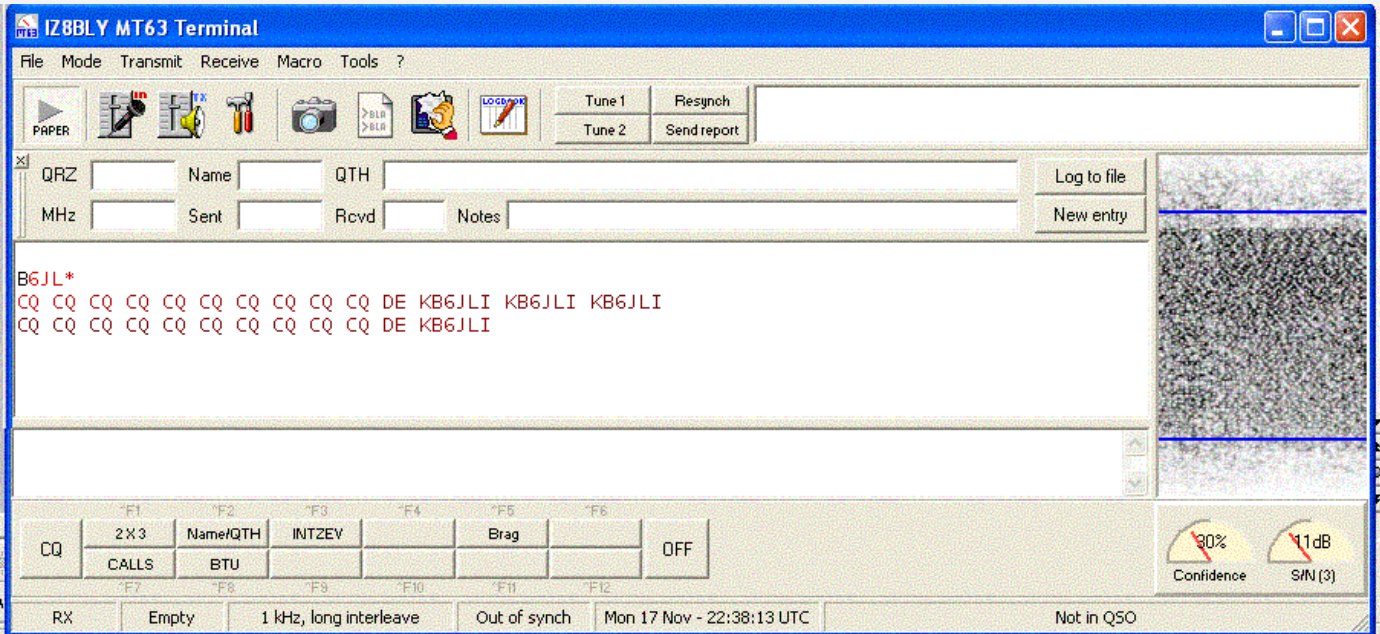
- [Amateur Radio Sound Blaster Software Collection](#)
- <http://members.fortunecity.com/xe1bef/soundcard.htm>

## Tuning your sound Card

### Setting Audio Levels:

The RX audio is first setup using a soundcard program such as MT-63 Terminal or Digipan. You need to set your radio audio level (if not a fixed port) to a level that is comfortable listening and NEVER, change it! A better method is to use the fixed audio level output from your transceiver's accessory plug if available.

Adjust the sound card audio INPUT level such that a nominal signal tuned in on the transceiver will be seen prominently in the program signal display window without overdriving the sound card input. (See the MT-63 Screen Shot below for an example of how this might look.)



**Note that other windows applications which you run on your PC that provide sound card adjustment controls may change your settings! You may have to re-adjust these levels.**

**Here's a little utility program that's a "MUST HAVE"! It allows you to store and retrieve your sound card settings, avoiding the process of readjusting each time another program changes them. [QuickMix](#) is freeware and can be downloaded from [here](#)**

**Adjust your radio MIC gain level for normal SSB operation.**

**[Turn off all speech processing.](#)**

**Adjust the sound card audio Playback Master Volume and Wave levels to the transceiver such that a small amount of ALC voltage is detected at the transceiver while transmitting into a proper antenna load (50 ohms), then back down until there is no ALC action at all on your transceiver meter. (The Master Volume is the course control and the Wave control is the fine adjustment.)**

**Several of the software packages help files have good detailed instructions on sound card tuning. There are many approaches to this, as you will see. Settings should be checked with each different mode and saved for later retrieval with QuickMix. Soundcard output may vary with frequency. Generally the highest output levels will be at lower frequencies, so make your adjustments on the lowest frequency you plan to use to prevent over driving on higher bands. The lower output on higher frequencies will still be adequate with these**

**modes.**