



Getting Started with *Winlink 2000*

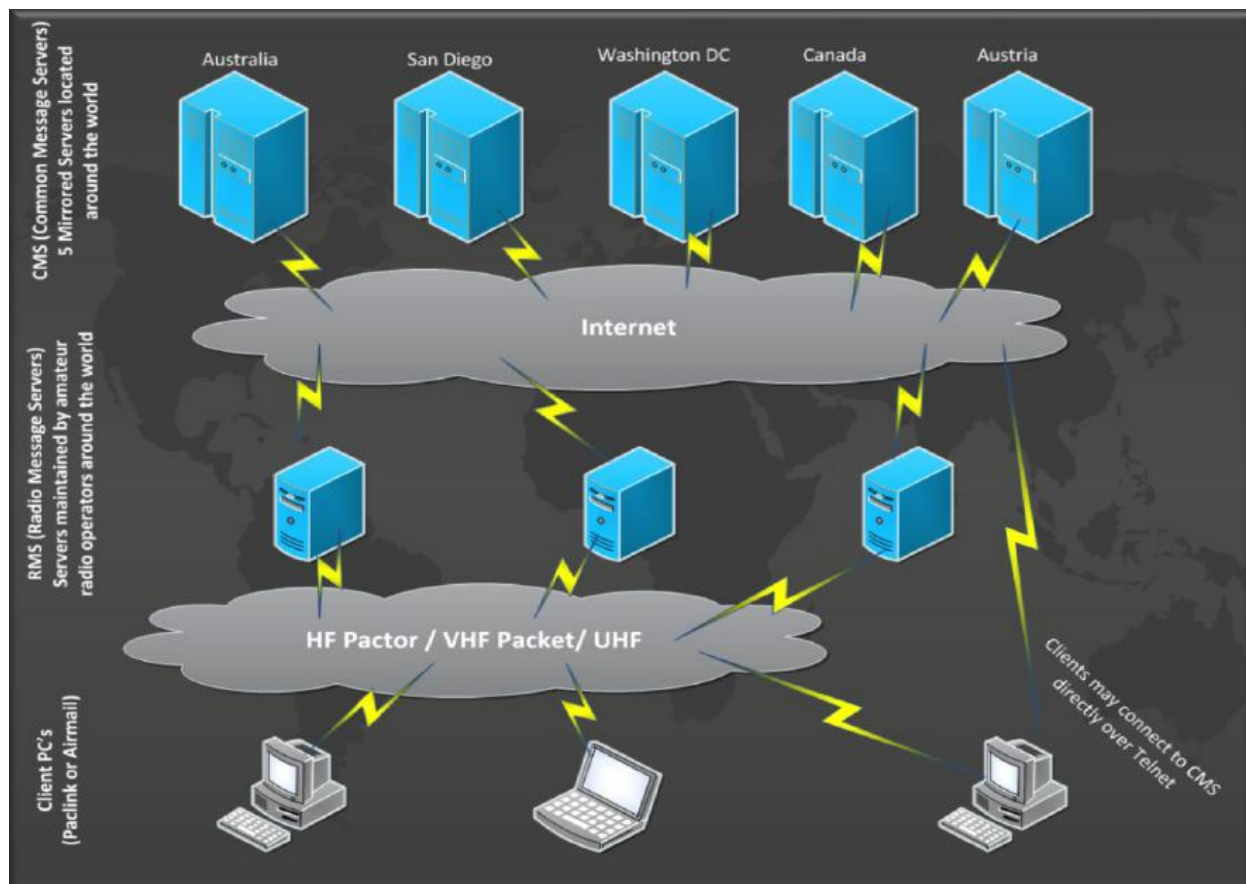


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Mar. 19, 2011

Introduction to Winlink:

Winlink 2000[™] (www.Winlink.org) is a worldwide system for sending and receiving e-mail over radio. Since the connection from the client computer to the Winlink server does not depend on the Internet, Winlink is widely used by mariners, RV campers, missionaries, and various agencies who need to communicate when the Internet is not available.



The Winlink system consists of a group of Common Message Servers (CMS) placed at various locations around the world. These servers connect via the Internet to Radio Message Servers (RMS) in many geographic locations to form a star network configuration. The Radio Message Servers are the VHF, UHF, or HF RF gateway into the Winlink system. The final component is the client computer (i.e., your computer) which runs software to send/receive messages through your radio.

Like regular e-mail, Winlink messages are sent to a specific address, and they may contain file attachments such as pictures, weather maps, spreadsheets, ICS forms, etc. E-mails can be sent between Winlink stations and normal SMTP/POP3 e-mail servers like gmail.com.

Winlink is heavily used by the U.S. and other governments, and many of the Radio Message Servers are restricted to non-amateur operations since they operate on non-amateur frequencies.

It is also possible to make direct, peer-to-peer, connections between two client computers (radio stations) that are within radio propagation range.

Remember that e-mails sent through Winlink on the ham bands must follow the usual rules for amateur radio communication, and thus, may not be used for commercial operations, they may not be encrypted, and third-party traffic rules apply.

You can visit this site to check the current status of RMS servers:

<http://www.Winlink.org/RMSHFStatus>

Winlink Connection Modes

There are four pathways for client computers to connect to the Winlink system:

- Via HF radio to one of the RMS hubs.
- Via VHF/UHF radio to a local RMS hub.
- Via the Telnet protocol over the Internet.
- Via Winlink WEBMAIL over the Internet.

Telnet connections are useful for testing the Winlink client software, but since the connection operates over the Internet, there isn't much advantage over using a regular e-mail service other than being good practice while learning to use the various Winlink client programs, or to keep from cluttering up the amateur spectrum, needlessly, during an emergency.

VHF/UHF Winlink Operation

Local area connections to a Winlink RMS server can be made over VHF/UHF connections if you have a local RMS hub. This type of connection uses the AX.25 packet protocol, which is different from HF transmissions, and it requires a specific type of modem. If you wish to connect to Winlink through a VHF/UHF packet system, a 1200 or 9600 baud packet modem is required; the modem speed must match the capabilities of the local RMS node. The Kantronics KPC-9612+ (<http://www.kantronics.com/products/kpc9612.html>) modem is recommended for 9600 baud; it costs about \$400. The Byonics TinyTrack4 (<http://www.byonics.com/tinytrak4/>) is recommended for 1200 baud; it costs about \$100 including cable. Because VHF/UHF Winlink connections depend on having the local radio system and local Internet infrastructure operational, they are less well suited for emergency communications than Winlink via HF. The focus of this paper will be on Winlink operations over HF rather than VHF/UHF.

HF Winlink Operation

Using HF radio frequencies, it is possible to connect into the Winlink system over long distances. In fact, one of the most popular uses is by mariners who need weather information, and who wish to contact family and friends via e-mail while cruising the high seas. HF Winlink provides a means of sending and receiving e-mails even if the Internet is unavailable or the local infrastructure is down. Thus, HF radio e-mail is a valuable resource for emergency situations.

As with all digital modes, certain protocols are used to encode data into a form that can be transmitted over the radio. This encoding process converts data bits into modulated sound signals that are then transmitted over radio waves. Two protocols are used for sending Winlink messages over HF:

- **Pactor 3** – Pactor 3 is a superior protocol that has proven itself by reliably sending data over long distances even with weak signals over extremely noisy conditions. Pactor 3 is becoming the standard used by most sailors and emergency organizations for HF contingency communications. Unfortunately, Pactor 3 is a proprietary protocol that requires a specific modem that costs about \$1,400. If you can afford an ocean-going sailboat, or have a provided budget for a radio system, the price of the modem is not bad, but it's out of the budget for most ordinary hams who really don't "need" it for their communications.
- **WINMOR** – WINMOR was developed by the Winlink Development Team as a low cost alternative to Pactor 3. WINMOR is an open (not proprietary) protocol, and it operates through low cost sound interface equipment such as the Signalink USB™. The tradeoff is that WINMOR is not as reliable or as fast as Pactor 3, but it beats anything else available to the amateur operator.

Both Pactor 3 and WINMOR include error correction and retransmission capabilities as well as data compression. Here is a comparison of the Pactor modes, and WINMOR:

Modem	Rate bits/sec (max)	Bandwidth	Cost (approx)
Pactor I	200 (1)	300 hz (2)	\$50-\$150
Pactor II	700 (1)	450 hz (3)	\$1,000-\$1,500
Pactor III	2722 (1)	2200-2400 hz max (1) can be narrower	\$1,150-\$1,650
WINMOR (4)	329	500 hz	Windows computer with sound card
WINMOR (4)	1314	1600 hz	Windows computer with sound card

What you need to access Winlink over HF using WINMOR

The requirements to use Winlink over HF are modest:

- A computer running Windows XP through Windows 7 with at least a Pentium II processor and one GB RAM. The Microsoft .NET foundation library is required.
- The RMS Express client software and the associated ITSHF propagation prediction program.
- A Signalink USB sound interface to go between the computer and the radio.
- A HF radio and associated antennas.

Putting the Hardware Together

If you already have a Signalink USB sound interface installed, you can skip this step.

The great thing about WINMOR is that you can use the inexpensive and popular Signalink USB sound interface. While it is possible to use your computer sound card with a connection like RigBlaster for popular digital modes such as PSK-31, it is necessary to use a secondary soundcard for WINMOR that is *not* controlled by the Windows™ operating system. The Signalink, which is the interface that was used when the WINMOR protocol was developed, is a soundcard interface that has been shown to work reliably with WINMOR. The Signalink, which is external to the computer, also works great with other digital modes such as PSK-31, RTTY,

and SSTV. In fact, it will work *much* more robustly than a soundcard shared by the Windows operating system.

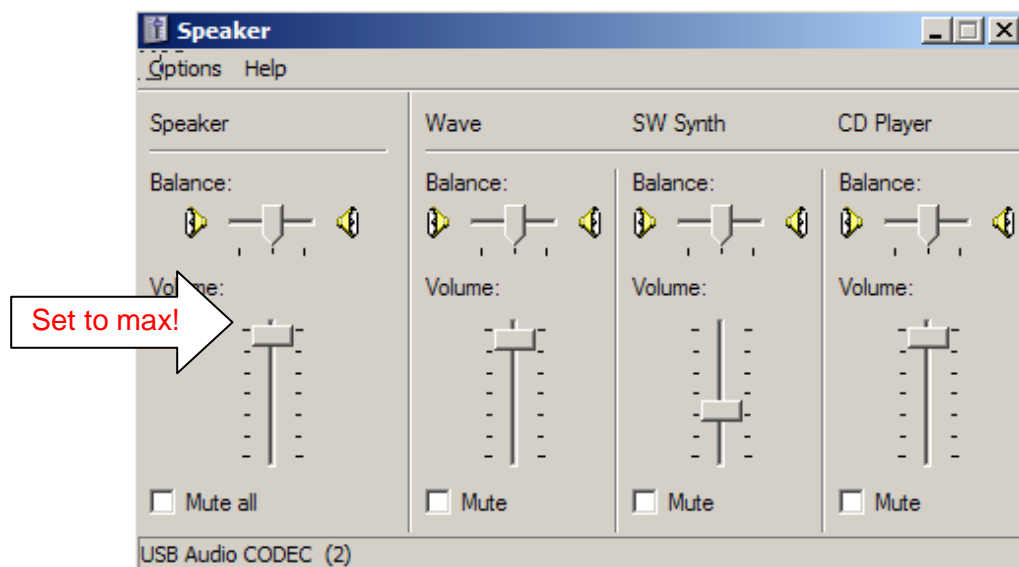
The Signalink USB sound interface is made by Tigertronics, and it costs about \$100. When you order it, you must select the appropriate cable to connect to your radio. The Signalink connects to your computer via USB, and it is powered by the USB, so you don't have to have another wall transformer.

Once you receive your Signalink, you have to open it and install jumpers to configure it for the type of radio you're using. This process takes about five minutes. We recommend that you do *not* purchase the pre-configured jumper blocks sold by Tigertronics. Several of us have been shipped the wrong version of the headers, and it is very confusing to figure out what the problem is. Installing the jumpers manually is very easy.

Set the RX and TX knobs on the Signalink to the halfway position (straight up), and set the DLY knob to full counterclockwise (minimum delay). You may have to adjust the receive and transmit levels later (see below for details).

It is recommended that ferrite beads (RF chokes) be placed on both ends of the Signalink cables. It's also a good idea to use a Radio Works choke on your antenna feed line to keep RF out of your shack.

After you connect the Signalink to your computer, you will see a new soundcard listed in your hardware. Be certain to follow the Signalink set up for the Windows operating system by following the manual that describes the procedure. It is critical that you set certain Windows volume levels, which are specifically described, to a maximum volume in order to trigger the VOX in the Signalink, and allow transmission. Even if your radio does not use the Signalink VOX, such maximum levels are necessary.



Installing the Software

The RMS Express Client program is what you will use to compose and read messages. It is very similar to other e-mail programs. Use this link to download the installation program for RMS Express:

<http://www.Winlink.org/ClientSoftware>

You also need to install the ITSHF propagation program that keeps track of available RMS frequencies:

<http://www.greg-hand.com/hfwin32.html>

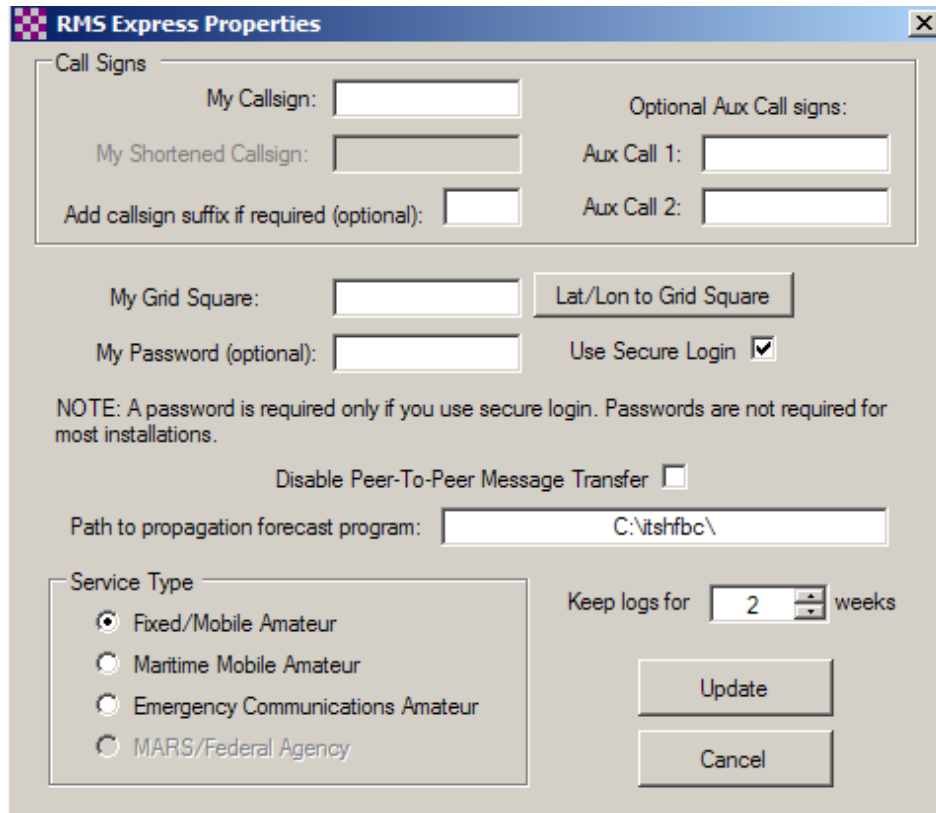
When you see the purple ITSHF Icon on your desktop, just delete it; it has no function.

The RMS Express installation procedure will *not* put an icon for RMS Express on your desktop. However, you can manually create one by using this procedure:

1. Use Windows Explorer to browse the folder C:\RMS Express\
2. Right click on the entry for "RMS Express.exe" and select from the popup menu "Send To...\Desktop (create shortcut)".

Starting and Configuring RMS Express

When you start RMS Express, it should display a configuration screen that looks like this. (If it doesn't, then click Files/RMS Express Setup.)



The screenshot shows the "RMS Express Properties" dialog box. It has a title bar with a close button (X). The dialog is divided into several sections:

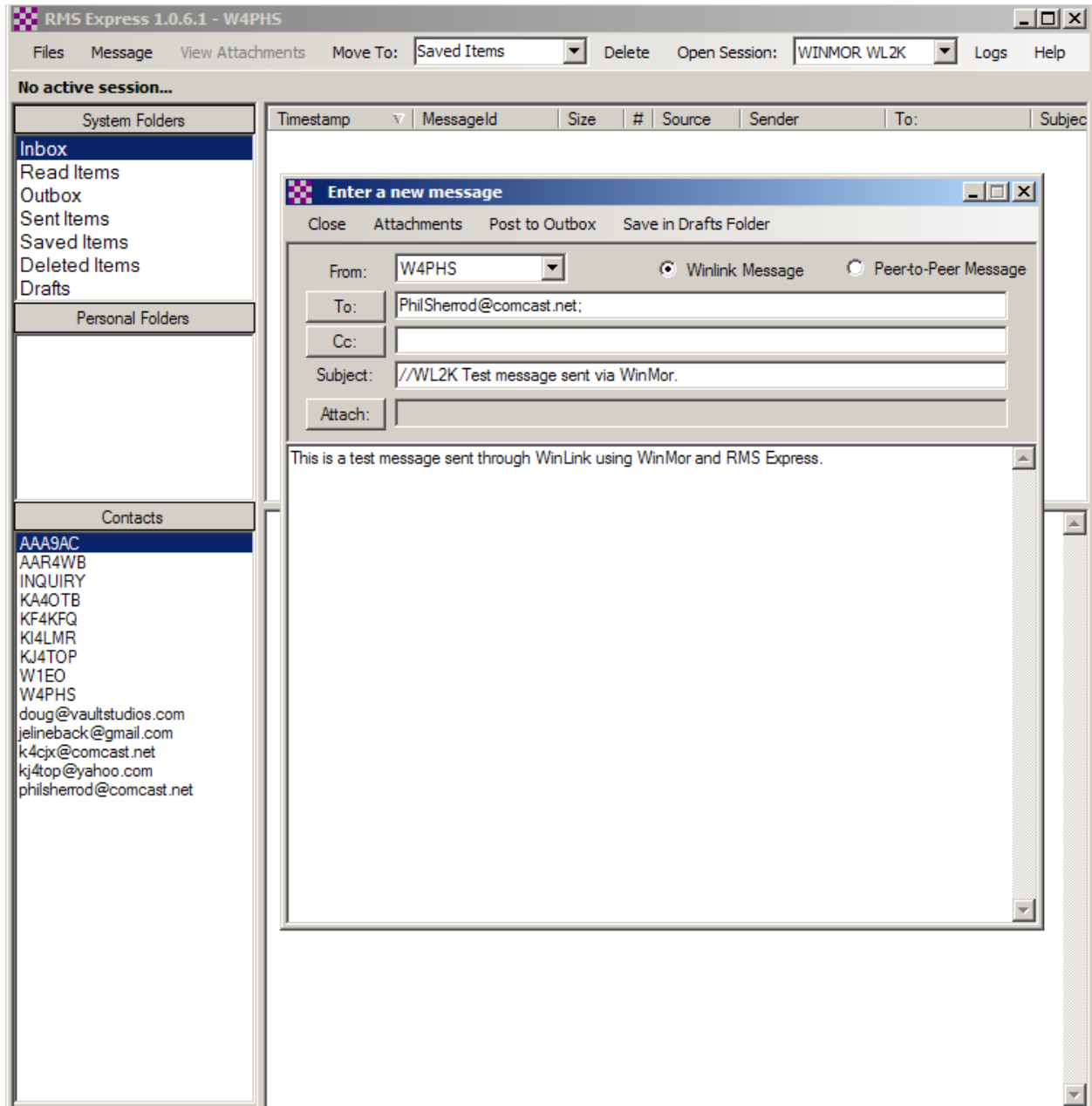
- Call Signs:** Contains fields for "My Callsign:", "My Shortened Callsign:", "Add callsign suffix if required (optional):", "Optional Aux Call signs:", "Aux Call 1:", and "Aux Call 2:".
- Grid Square:** Contains a field for "My Grid Square:" and a button labeled "Lat/Lon to Grid Square".
- Password:** Contains a field for "My Password (optional):" and a checked checkbox for "Use Secure Login".
- NOTE:** A note stating "A password is required only if you use secure login. Passwords are not required for most installations."
- Transfer:** A checkbox for "Disable Peer-To-Peer Message Transfer".
- Path:** A text box for "Path to propagation forecast program:" containing the text "C:\tshfbc\".
- Service Type:** A group box containing four radio button options: "Fixed/Mobile Amateur" (selected), "Maritime Mobile Amateur", "Emergency Communications Amateur", and "MARS/Federal Agency".
- Logs:** A label "Keep logs for" followed by a spin box set to "2" and the word "weeks".
- Buttons:** "Update" and "Cancel" buttons at the bottom right.

You need to fill in your call sign and your grid square. Do not enter a password, and do ***not*** check "Use secure login". Select "Fixed/Mobile amateur" at the bottom, then click the Update button.

Sending a Message

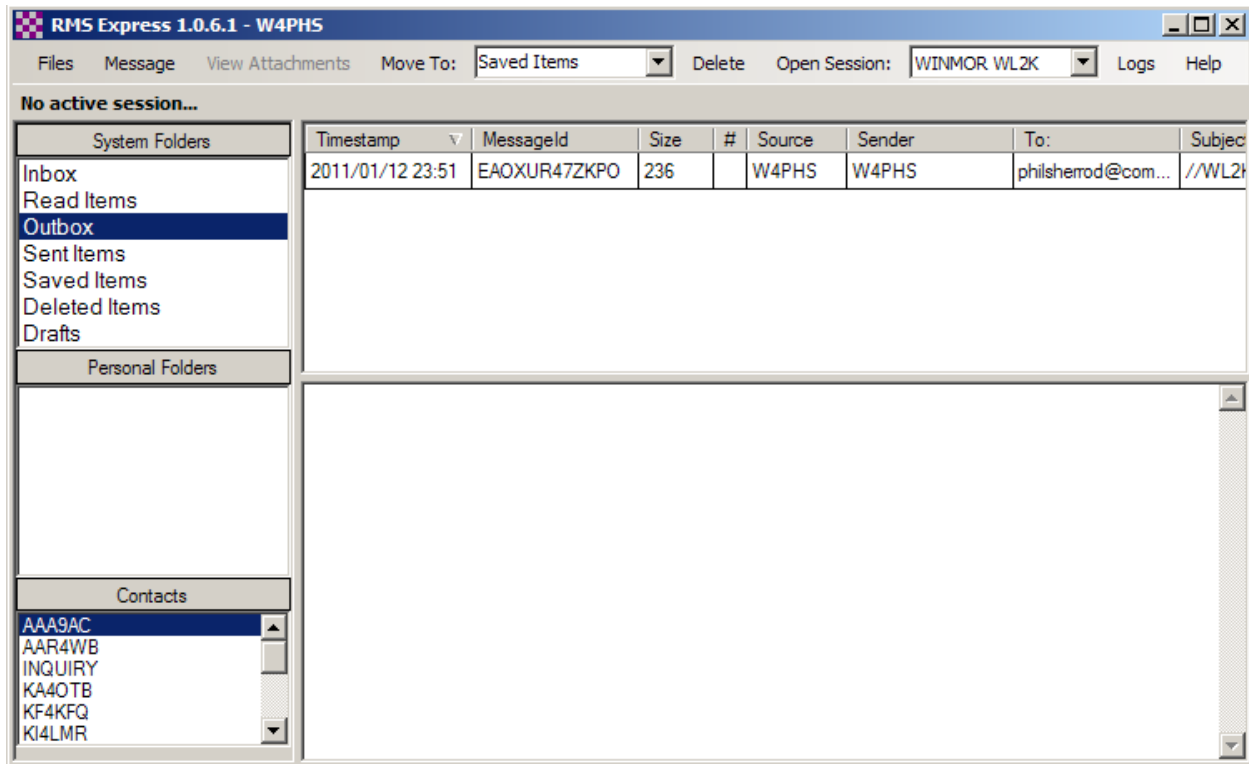
OK, we're finally ready to have some fun.

The next step is to try to send a message to your normal (not Winlink) e-mail address. To do that, click "Message" on the top menu bar followed by "New Message". A popup screen will appear where you can enter the destination address, the subject, and the body of the message.



Once you finish entering the message, click "Post to outbox".

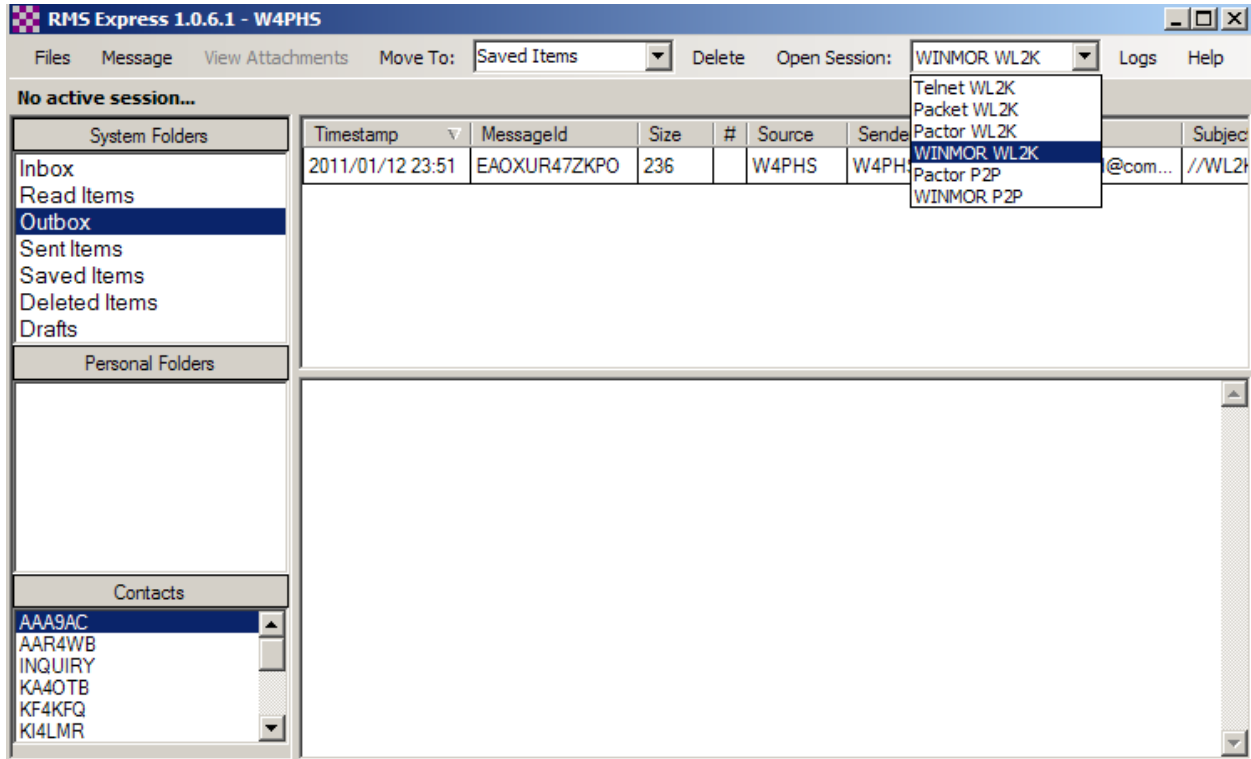
If you select "Outbox" in the left panel, you can see the pending message.



Note: When sending a message **to** a Winlink address, you should put **“//WL2K”** at the front of the subject. This is required to keep the Winlink system from blocking the message as spam. You do not have to use this when sending messages through Winlink to external addresses, but it’s a good idea to get in the habit of using the prefix whenever you deal with Winlink e-mail.

Opening a WINMOR session

Next, look at the top menu bar and make sure “**WINMOR WL2K**” is shown next to “Open session:”. If it isn’t, open the drop-down list and select it.



Make sure no other radio control program like Ham Radio Deluxe is running, and then click the “Open session” menu button. Two screens should appear. One is the session control screen (shown above in the following image), and the second is the WINMOR TNC monitor screen.

WINMOR Winlink Session - W4PHS

Exit Setup Switch to Peer-to-Peer Session Channel Selection Show/Hide TNC **Start** Stop Abort

K9BBS-10 Center Frequency (kHz): 3576.000 Dial Frequency (kHz): 3574.500

Channel Free In: 0/0 Out: 0/0 BPM: 0/0 Disconnected

WINMOR Sound Card TNC Port:8500

Help Hide Send ID

Connection State

DISCONNECTED

TCP Capture OK

Transmit

0 Avg ACK Percentage 100

Xmt Frame:

Receive

Rcv Level:

Remote Station Offset: 184.9 Hz

Rcv Frame:

Busy Detector

Channel Clear

Squelch: 5

Constellation

WINMOR TNC Registration

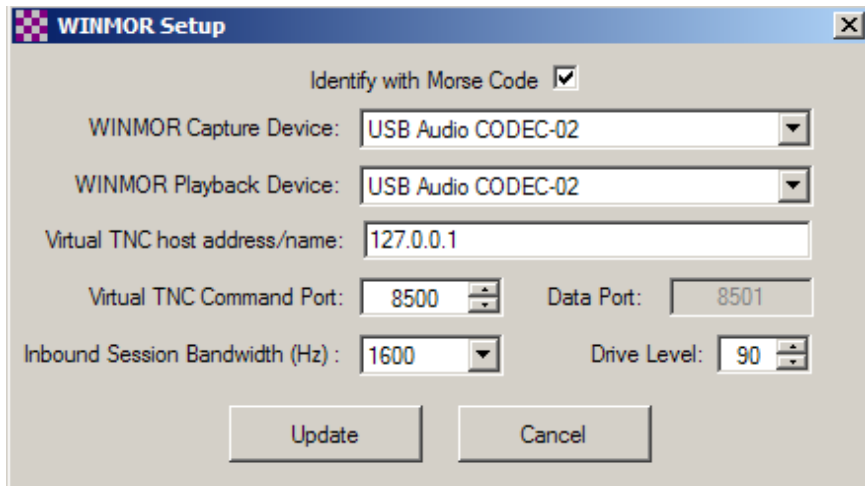
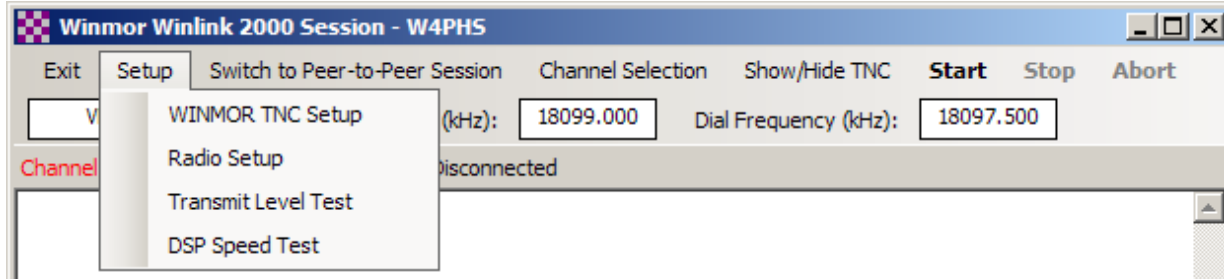
Each time you start a session, you will see a reminder screen that looks like this:



This is a reminder that you should register your copy of the WINMOR TNC. It is not necessary to register to use WINMOR; just click the “Remind me later” button, and you can proceed. However, it is well worth a \$39 donation to the Amateur Radio Safety Foundation to support that organization and obtain a registration key for WINMOR that will suppress this screen.

Setting up the WINMOR Session Control

Click “Setup” on the session control screen and select “WINMOR TNC Setup” from the drop-down list to open the setup screen.



Select the sound card entry corresponding to the SignalLink in the WINMOR Capture and Playback fields. After you finish filling in the soundcard information, click the “Update” button to save the information and close the screen.

Next, click “Setup” on the session control screen and select “Radio Setup” from the drop-down menu to display the radio setup screen:

Winmor WL2K Settings

Radio Selection

Select Radio Model: Icom Amateur Radios Antenna Selection: Default

Icom Address: 00 USB: USB Digital: FM: Use Internal Tuner:

Radio Control Port

Serial Port to Use: COM7 Baud: 19200 Enable RTS: Enable DTR: TTL:

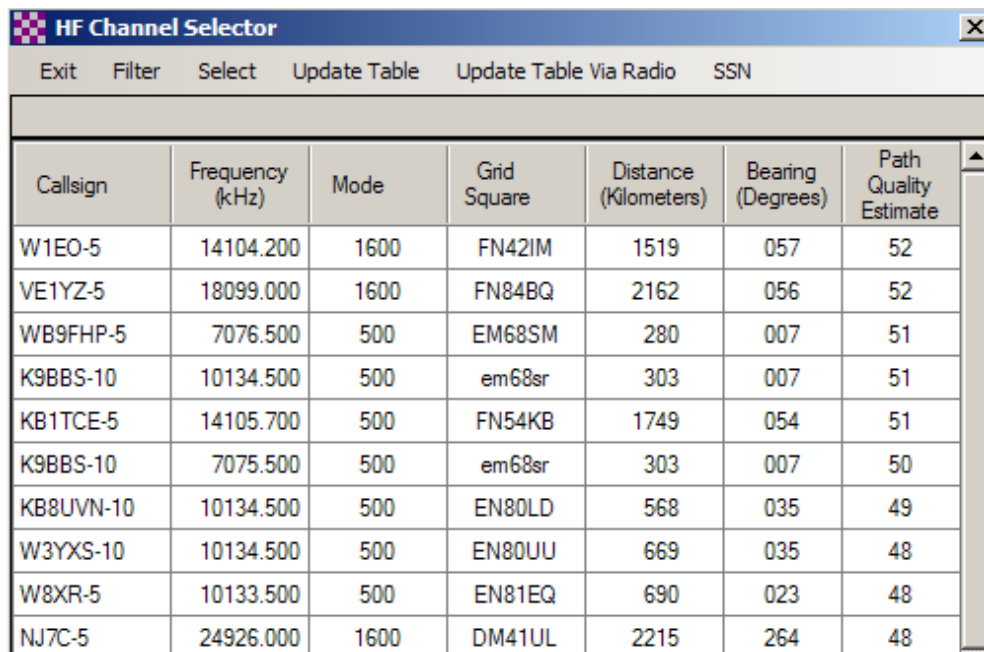
PTT Port (Optional)

Serial Port to Use: External Baud: 38400 Enable RTS: Enable DTR:

Update Close

Open the “Select Radio Model” list and select the entry that is closest to the type of radio you have. Set the Radio Control Port fields to match the COM port and baud rate of your radio control interface. Set the PTT Port option to “External”. If you don’t have the ability to automatically control your radio, you can still use RMS Express. Just manually tune to the “dial frequency,” and set USB SSB mode. Click Update to close the setup screen.

Next, you need to select the RMS station that you are going to use. Click “Channel Selection” on the session control screen to open the list of available RMS hubs:



Callsign	Frequency (kHz)	Mode	Grid Square	Distance (Kilometers)	Bearing (Degrees)	Path Quality Estimate
W1EO-5	14104.200	1600	FN42IM	1519	057	52
VE1YZ-5	18099.000	1600	FN84BQ	2162	056	52
WB9FHP-5	7076.500	500	EM68SM	280	007	51
K9BBS-10	10134.500	500	em68sr	303	007	51
KB1TCE-5	14105.700	500	FN54KB	1749	054	51
K9BBS-10	7075.500	500	em68sr	303	007	50
KB8UVN-10	10134.500	500	EN80LD	568	035	49
W3YXS-10	10134.500	500	EN80UU	669	035	48
W8XR-5	10133.500	500	EN81EQ	690	023	48
NJ7C-5	24926.000	1600	DM41UL	2215	264	48

Updating the List of Available RMS Stations

Using the ITSHF propagation program, RMS Express can show you which RMS stations are available, recommend which ones are most likely to be accessible, and set your radio to the right frequency. In order to accomplish this, the current list of stations must be downloaded to your computer. The list of stations is updated regularly, so it's a good idea to refresh the list every week. To update the list, click “Update Table” on the HF Channel Selector screen (see above). If you have RMS Express set up and working, you can click “Update Table via Radio” to download propagation information through a radio connection. Initially, you should select “Update Table”, and let it download the initial list of RMS stations via the Internet.

Setting Sunspot Number (SSN)

For the best accuracy in propagation prediction, click “SSN” on the menu bar, and enter the current Sunspot Number (SSN) value. You can use the IonoProbe program (<http://www.dxatlas.com/IonoProbe/>) as well as various web sites to determine the current SSN value. If you don't know the current SSN value, leave the default value alone.

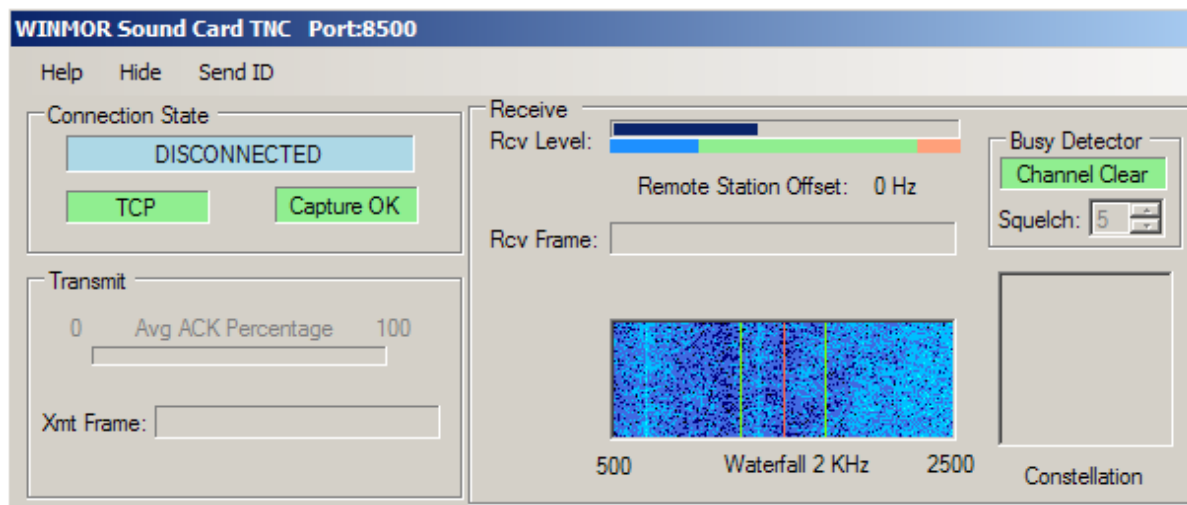
RMS Channel Selection and Propagation Estimates

The “Path Quality Estimate” is a rough estimate of how good the signal path is likely to be between your QTH and the RMS hub. My experience has been that these estimates are not very accurate, and some stations down the list may work better than those near the top. With experience, you will find stations that usually work best for you.

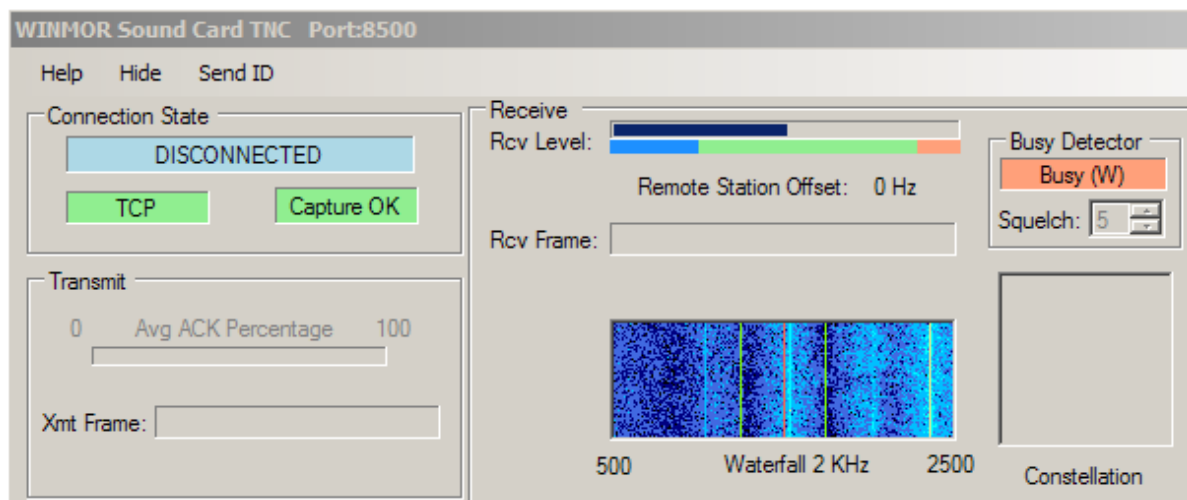
Double click an entry in the station list to select the station and tune your radio to that frequency. *Your radio must be in USB (upper side band) SSB mode regardless of the band you're using.* Turn off voice compression and any notch filter, and make sure you select a bandwidth filter of at least 2.3k. Some people recommend turning off DSP noise reduction, but I've had good success with it on.

Next, check the TNC interface screen to see if the channel you've selected is clear or busy.

Here is an example of a clear channel:

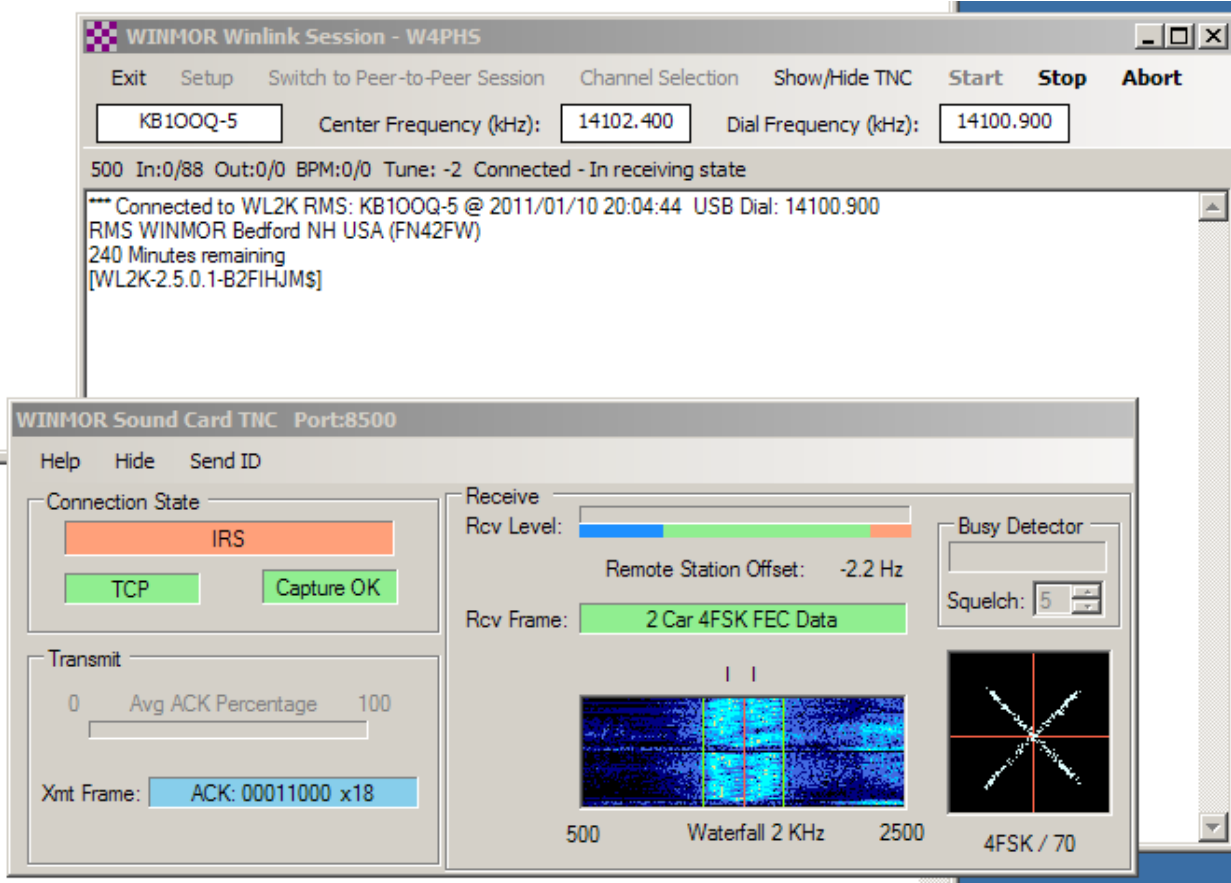


And here is an example of a busy channel:



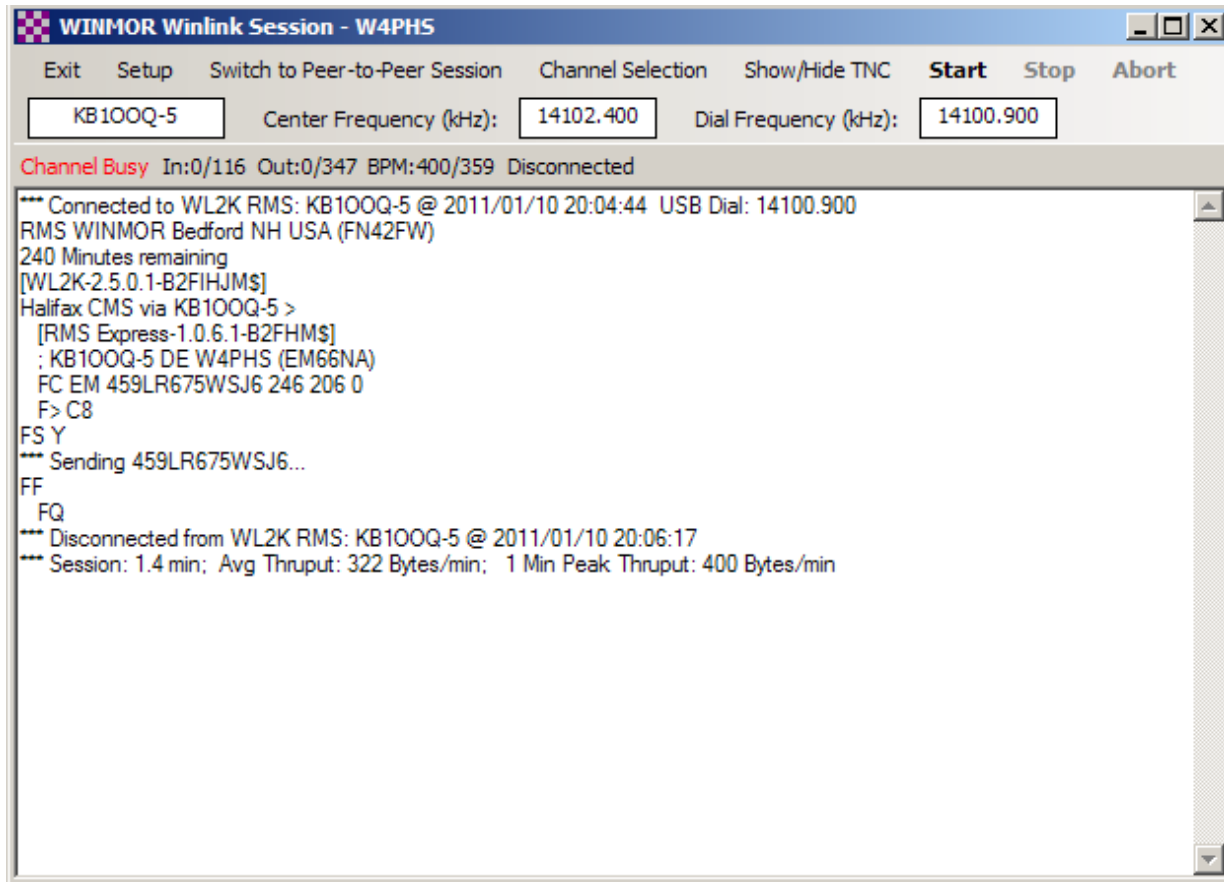
The “Busy Detector” on the TNC display should tell you if the channel is busy or clear, but it is often confused by noise, so it's best to look at the waterfall display to see if a signal is visible. If the channel is busy, either wait for the other station to finish or select a different channel.

Once the channel is clear, click the “Start” button on the session control screen to try to connect to the RMS hub. If a connection is made, you should see screens looking like this:



If you can't connect, try a different channel. If you do connect, watch the "Rcv Level" bar at the top of the TNC screen to make sure your received audio signal level is in the green zone. If it isn't, adjust the "RX" knob on the SignalLink to get it in the green region.

If the connection is successful, everything should happen automatically: RMS Express will logon to the RMS server, it will send any pending messages in your outbox, and it will pull down any incoming messages and put them in your inbox. The session control screen will log what's happening:



You can then close the session control screen by clicking “Exit” to return to the RMS Express message screen where you can browse your inbox.

Once you successfully send your first e-mail via WINMOR, you will have an assigned e-mail address in the Winlink system. Your e-mail is callsign@Winlink.org. Where *callsign* is your call sign. You can then send yourself a test message from your external e-mail system. Remember to put “//WL2K” at the front of the subject of messages going to Winlink e-mail addresses. After you send the message, run RMS Express, and connect to a RMS hub to pull down the incoming mail.

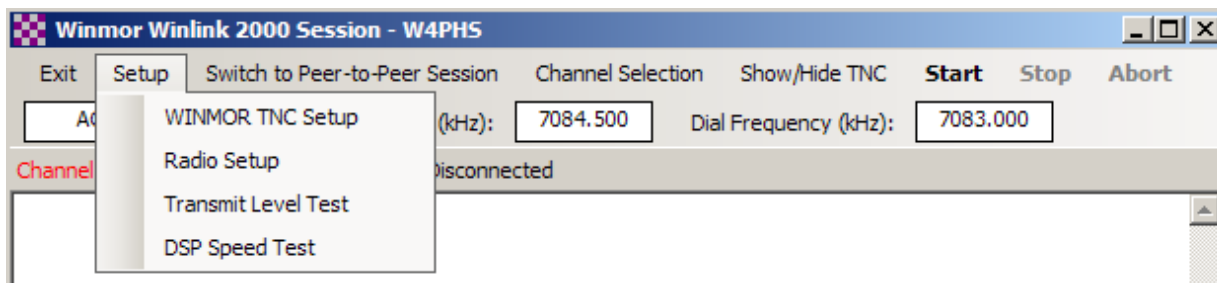
You can also register for web access to your Winlink messages. To do that, go to the Winlink home site which is <http://www.Winlink.org>

Adjusting Transmit and Receive Audio Levels

For the most reliable connections, it is a good idea to adjust the transmit and receive (TX/RX) controls on the SignalLink to achieve optimal audio levels.

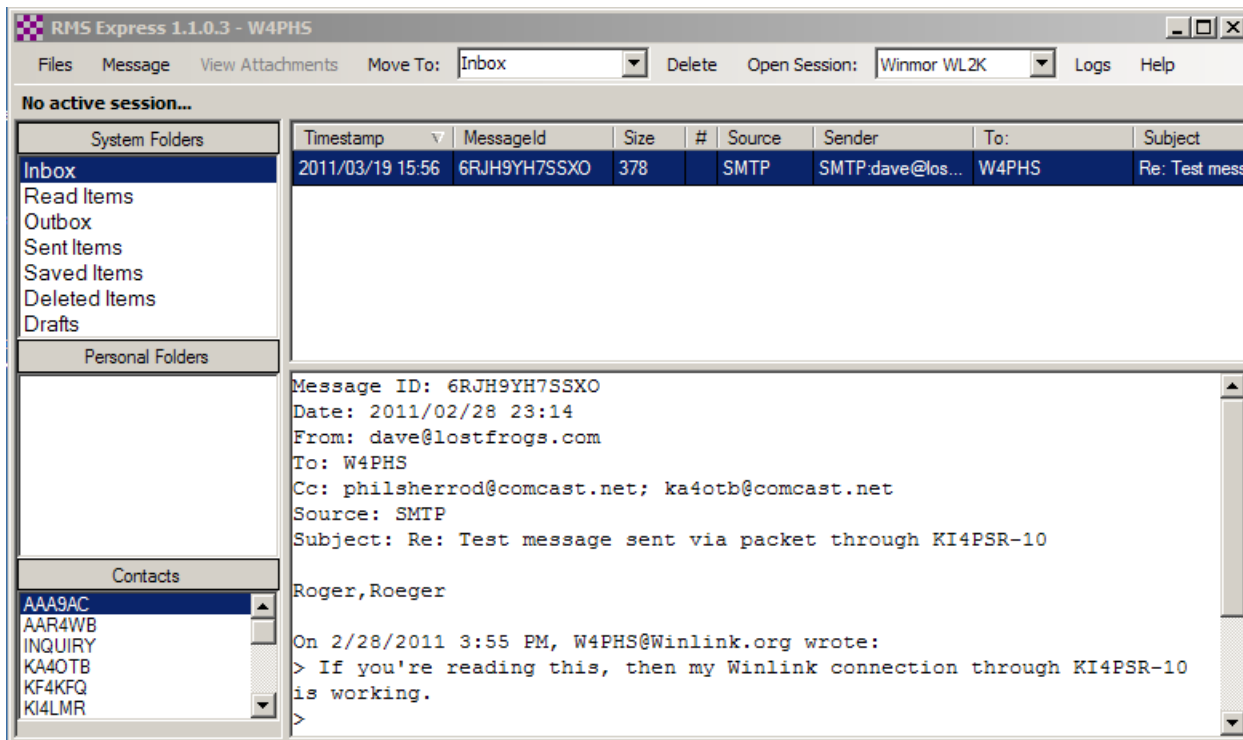
Receive audio setting – As described above, when you are connected to an RMS server and receiving incoming packets, the “Rcv Level” bar on the WINMOR TNC screen shows the level of the received audio signal. You should adjust the RX control on the SignalLink so that the audio level is approximately centered above the green portion of the bar.

Transmit audio setting – The transmit audio setting is measured using the ALC (Automatic Level Control) screen in your radio. The Signalink TX control should be set so that the automatic gain control (AGC) in your radio’s menus shows about 25% from the bottom. Make sure you turn off audio compression in your radio. Basically, you want TX set as low as possible but high enough that your radio can deliver its full power. Once you find the ALC screen in your radio, you can click “Setup” on the RMS session control screen and select “Transmit Level Test” from the drop-down menu to start a 4 second transmission. Make sure you aren’t transmitting on a busy channel when you do this test.

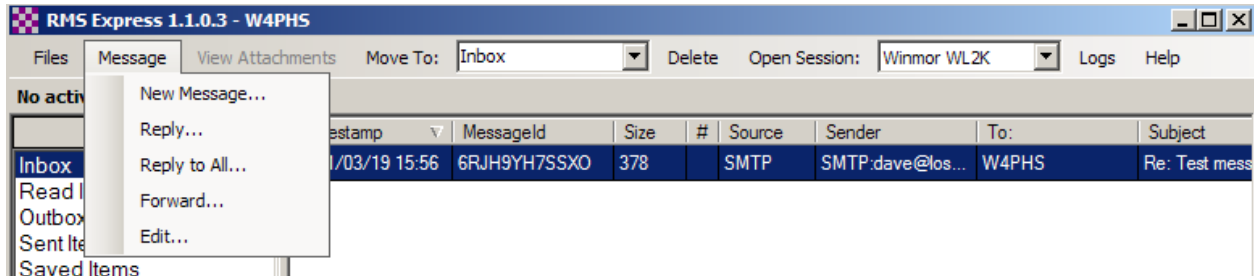


Receiving E-mail Messages via Winlink

Each time you connect to an RMS hub using RMS Express, it checks automatically to see if you have any incoming mail, downloads it, and places it in the RMS Express Inbox. So, to check if you having incoming mail, just click “Open Session” on the RMS Express main menu and connect to an RMS hub. Remember that any message sent to you through Winlink must have “//WL2K” at the front of the subject unless the sender’s address is in your Contacts list.



To reply to an e-mail, select the e-mail entry and then click “Message” on the menu bar and select “Reply” or “Reply to all” from the drop-down list.

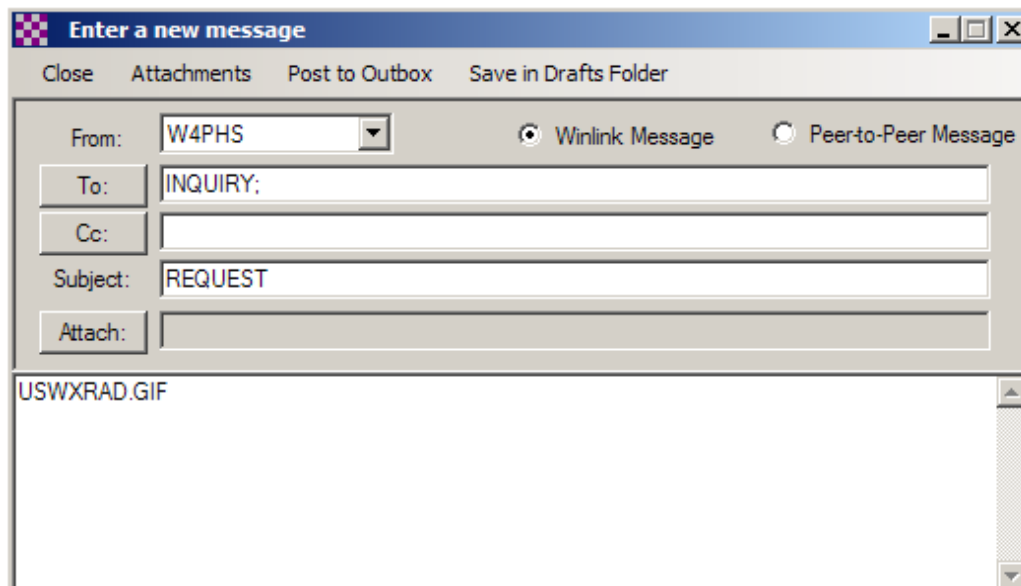


As you read incoming messages, they will be moved automatically from the Inbox to the “Read Items” box.

Requesting Weather Maps, Forecasts, and Other Information

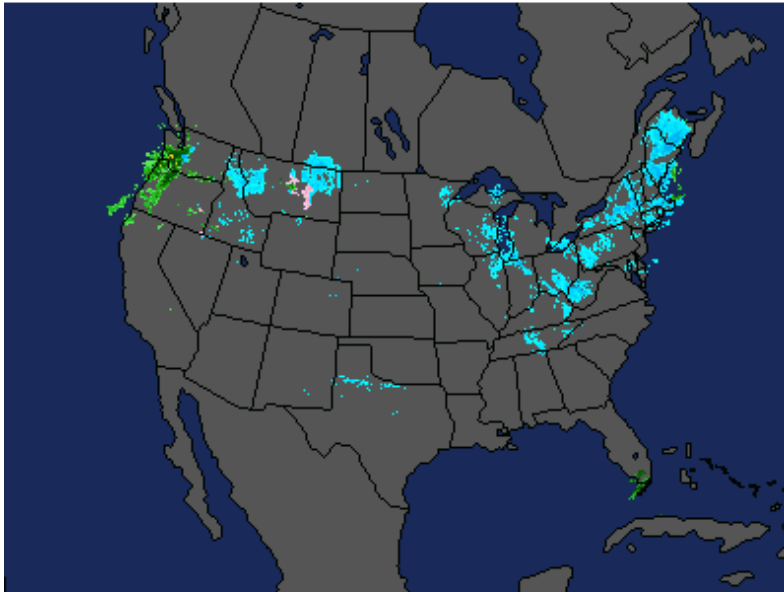
In addition to sending/receiving regular e-mails, you can send specially formatted messages to the Winlink system to request weather maps, forecasts, and other information. To do this, send a message to INQUIRY with a subject of REQUEST. In the body of the message, specify the item of information you want. For example, put USWXRAD.GIF in the body to request a U.S. weather radar image. Put LIST in the body of the message to request a catalog of the items that are available on request. After you send a request, wait a few minutes, and then connect to a RMS server to check for return mail that will contain the information you requested.

For example, here is a request for a U.S. weather radar map:



Here is a radar map sent to us from Winlink:

6:45PM EST 12-JAN-11



©2011 AccuWeather.com

Common problems

- **The radio frequency does not change when I select a RMS channel** – Check the COM port number and baud rate settings in the session control setup screen. If you are able to use other programs like Ham Radio Deluxe to control your radio, check how you have them configured.
- **I see noise on the TNC waterfall, but I can't connect to any RMS server** – Make sure your radio is in **USB** SSB mode (even for 40 and 80 meters), and make sure it is tuned to the “dial frequency” shown in the session control screen. There is a 1500 Hz difference between the actual, Center (assigned) frequency and the USB dial frequency shown on your radio dial. Thus, the “dial” frequency shown on your radio is different than the actual frequency. Also, with the Signalink USB, insure that the Delay is set to minimum.
- **I can see a signal on the TNC interface screen, but the Signalink and radio do not transmit when I try to connect** – Check the Windows volume settings for the Signalink sound device. Set them all to maximum volume. If you've done this and it still won't transmit, open the Signalink and install the JP4 jumper that increases its sensitivity to sound.
- **I can successfully send myself a message to an external e-mail address, but I can't receive incoming messages** – Make sure you specify “//WL2K” as a prefix to the subject of any messages sent to a Winlink address.

- **The “Channel selection” feature on the session control screen does not work** – You need to install (or reinstall) the ITSHF propagation program that keeps track of available RMS frequencies. You may not have downloaded the list of RMS stations. Click “Files” on the RMS Express menu bar and then select “Update HF channels data” to download the list via the Internet.
- **I see many retries being done** – Check to make sure the receive signal level is in the green section at the top of the TNC interface screen. Adjust the “RX” knob on the SignalLink to get the sound level right. If the receive level is correct, try adjusting the “TX” knob to set the transmit audio level. Make sure speech compression is turned off and a wide bandwidth filter is selected. Try some other RMS stations.

What’s Next?

You can find much more information about Winlink, WINMOR, and RMS Express on the Winlink web page: <http://www.Winlink.org>

There is a Yahoo discussion group specifically for WINMOR and RMS Express:
<http://groups.yahoo.com/group/WINMOR/>

OK, it’s time to experiment. Get the hardware set up and the software installed and try to send yourself a message. Good luck!

73

Phil, W4PHS