CQ CHATTER

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WOOD COUNTY AMATEUR RADIO CLUB

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http://wcarc.bgsu.edu

Digital Communications in Amateur Radio VI

by Jeff Kopcak, K8JTK

Jeff is a long-time member of WCARC, dating back to his days at BGSU. He has always had an interest in computers and computing, and is currently employed as an IT specialist in Cleveland. Jeff serves as the webmaster of the WCARC web page (see masthead for URL). Jeff also serves as the ARRL Ohio Section as Section Technical Coordinator—-ed.

Hurricane season wasn't particularly fun in 2017. We had both extremes. Houston got hit with Hurricane Harvey which required little response from the ham community. Infrastructure stayed online. Disruption to communication systems and Internet was minimal. This left many hams wondering, 'are we at the point where our infrastructure is stable enough to survive a category 4 hurricane?' 'Are hams still relevant, since we were not needed for this type of event?' We got the answer to those questions over the next month with two category 5 hurricanes. Irma impacted the state of Florida, and Maria devastated the relatively poor U.S. possession of Puerto Rico. We went from wondering if ham radio was still relevant in emergency situations to rethinking training for extended deployment scenarios, all within a matter of weeks.

Ham radio news sources pointed out that many communication techniques were utilized getting traffic in and out of affected areas. An ARRL press release indicated "Maxim Memorial Station W1AW at ARRL Headquarters is monitoring the HWN, 60-meter interoperabili-

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AM Rally Set for February 2-4

The second-annual AM Rally is inviting operators to explore the original phone mode over the February 2-4 weekend. Co-sponsor Clark Burgard, N1BCG, said the event "is intended to be both fun and educational." It encourages all radio amateurs to get on AM, possibly for the first time. "Because of resurgent interest in AM, the event is also an opportunity for amateurs new to AM to learn about proper settings and get the most performance out of their station, whether it's

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Net Check Ins

Jan 2 Traffic: 0

WB8NQW (NCS)
K8JU
WD8LEI
KD8NJW
KD8RNO
N1RB
N8VNT
KA8VNG
KG8FH
KC8EKT
KE8CVA
KD8VWU (12)

Jan 9 Traffic: 0

K8OVO (NCS)
K8JU
KC8EKT
KE8CVA
KG8FH
KD8RNO
KD8NJW
WB8NQW
N1RB
N8VNT
KD8VWU
KA8VNG
WD8LEI
WD8ICP
WB8UPA (15)

Jan 16 Traffic: 0

WB8NQW (NCS)
KE8CVA/M
K8BBK
KC8EKT
KG8FH
WD8JWJ
KD8RNO
N1RB

Brain Teasers

1. How is an HF RTTY signal usually produced?

a.) by frequency shift-keying an RF signal

b.) by on/off keying an RF signal

c.) by digital pulse-code keying of an unmodulated signal

d.) by on/off keying an audio frequency signal

2. When may you deliberately interfere with another station's communications?

a.) only if the station is operating illegally

b.) only if the station begins transmitting on a frequency you are using

c.) never

d.) you may expect, and cause, deliberate interference because it can't be helped during crowded band conditions.

3. What is the maximum transmitting power permitted an amateur station in beacon operation?

a.) 10 W PEP

b.) 100 W PEP

c.) 500 W PEP

d.) 1500 W PEP

February Contests

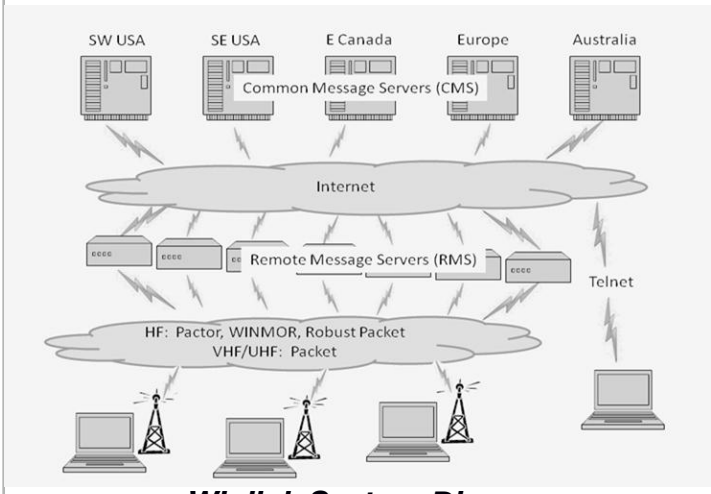
The contest lineup for the month of February is given below. Please note that the WARC bands (60, 30, 17 and 12 m) are never open to contesting.

Feb 3	*1400 to 2359 Z*	160 m to 10 m
Minnesota QSO Party		**all modes**
Feb 3-4	*0000 to 2359 Z*	160 m on up
Vermont QSO Party		**all modes**
Feb 3-4	*0001 to 2359 Z*	10 m
10-10 Int'l Winter 'test		**Phone**
Feb 3-4	*1600 to 2359 Z*	160 m to 10 m
British Columbia QSO Party		**all modes**
Feb 10-11	*0000 to 2359 Z*	80 m to 10 m
CQ WW RTTY WPX 'test		**RTTY**
Feb 10-11	*1200 to 1200 Z*	160 m to 10 m
Dutch PACC 'test		**CW-Phone**
Feb 12-16	*1300 to 2359 Z*	160 m to 10 m
ARRL School Club Roundup		**CW-Phone**
Feb 17-18	*0000 to 2359 Z*	160 m to 10 m
ARRL Int'l DX 'test		**CW**
Feb 24-25	*0600 to 1800 Z*	80 m to 10 m
REF (France) DX 'test		**SSB**
Feb 24-25	*1300 to 1300 Z*	80 m to 10 m
UBA (Belgium) DX 'test		**CW**
Feb 24-25	*1500 to 0159 Z*	160 m to 10 m
South Carolina QSO Party		**all modes**

digital—from p. 1

ty channel 2, and Winlink for any traffic." Winlink gained prevalence in ham news media due to these disasters, gained popularity in emergency communications circles, and became an operating requirement for hams that assisted in Puerto Rico. Winlink is a very powerful and flexible system for exchanging all types of messages.

Winlink (also known as Winlink 2000) is a worldwide radio messaging system that uses amateur-band radio frequencies to provide radio interconnection services that include e-mail with attachments, position reporting, weather bulletins, emergency relief communications, and message relay" (**Wikipedia**). In other words, Winlink is a global e-mail system via radio. The backbone uses the Internet for communication, but users do not need an Internet connection. This makes the system popular in Emcomm when the Internet is not available. Winlink was first used recreationally by mariners, RV campers, and missionaries. The entire system is run by volunteers and a 501(c)(3) not-for-profit organization. Though



Winlink System Diagram

similar in name, the "WIN System" is a popular IRLP repeater system based in California, and is entirely different.

https://www.winlink.org/content/getting_started_winlink_and_winmor

The Winlink system consists of multiple Common Message Servers (**CMS**) on multiple continents thought the world. The CMS servers form a "star" network configuration to coordinate traffic and provide services like e-mail, webmail, telnet, bulletins, and reporting. Each CMS is a mirror image of the others for redundancy, failover, and outage situations. The Internet, by design, can work around outages. To date, there has been no global outage of the Internet – only regional. Having multiple servers, with redundant copies of the same data, means one or more could be affected by an outage and the system still functions. As of November 1, 2017, the CMS servers have been moved into the Amazon Web Services (AWS) cloud for greater redundancy.

Remote Message Servers (**RMS**) are scattered throughout the world and are the RF connection into the Winlink system. RMS gateways access the resources of the CMS servers via the Internet. These nodes are provided by hams familiar with the system and are setup on many ham bands (HF, VHF, UHF). On VHF/UHF, connectivity is limited to local clients. HF gateways serve a wider area but depend heavily on band conditions.

Finally, your computer runs the **client software** which interacts with services provided by the CMS, most often through an RMS gateway. The client software sends and receives messages. Size is limited to 120KB maximum, including attachments. Winlink uses a "store and forward" approach to messaging, mean-

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WCARC Weekly Net

Tuesdays at 2100 all year

147.18 MHz 67 Hz PL

Net Control Roster

Feb 6	*KD8NJW*
Feb 13	*NM8W*
Feb 20	*K8OVO*
Feb 27	*WB8NQW*
Mar 6	*N1RB*
Mar 13	*KD8VWU*

NEXT MEETING

Business Meeting

Monday, Feb. 12th

TIME: 7:30pm/7:00 EB

PLACE:

Sheriff's Training Room
Dunbridge Rd.
& Gypsy Lane Rd.
Bowling Green, OH

DON'T FORGET! 10 meter Net

meets Sunday@ 2030

on 28.335 MHz

February Contests—cont.

Feb 24-25	*1800 to 0559 Z*	80 m to 10 m
North American QSO Party		**RTTY**
Feb 25-26	*1500 to 0059 Z*	80 m to 10 m
North Carolina QSO Party		**all modes**

Net Check Ins
continued

Jan 16-continued

N8VNT
K8JU
WD8PIC
KE8IJR (13)

Jan 23 Traffic: 0

N1RB (NCS)
NM8W
WD8JWJ
KD8RNO
K8BBK
KC8EKT
KG8FH
KE8CVA
K8JU
KD8NJW
WB8NQW
N8VNT
WD8ICP
WD8LEI
KE8CUZ
KD8VWU (16)

Jan 30 Traffic: 0

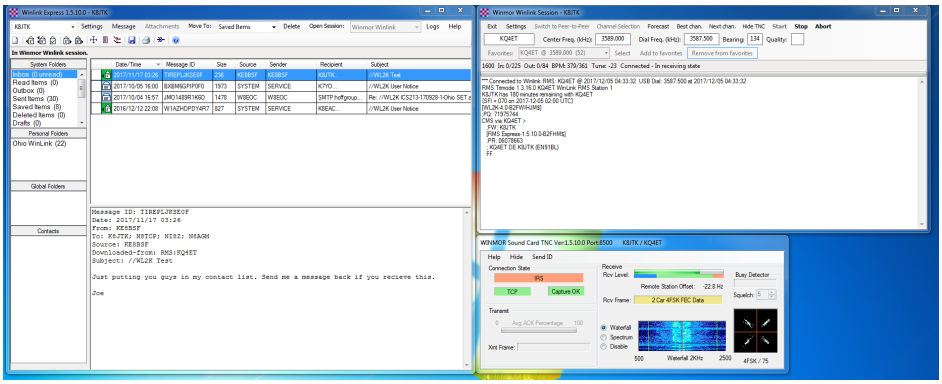
KD8VWU (NCS)
KD8RNO
WD8JWJ
KE8CVA
KC8EKT
KE8CUZ
KG8FH
WB8NQW
KD8NJW
N8VNT
N1RB (11)

Brain Teaser answers: (T) 1-a, 2-c, 3-a

digital—from p. 4

ing clients are not constantly connected to an RMS or CMS gateway.

There are currently 6 client software applications



Winlink Layout

available for Winlink. A feature comparison is available at: **https://www.winlink.org/ClientSoftware**. Winlink Express (formally RMS Express) is the preferred client because it's developed by the system administrators and supports all features of the system. The software is well-supported and frequently updated. The application looks and operates much like a stripped-down e-mail client. Using a familiar e-mail interface makes the application easy-to-use. Though free to download and use, Winlink Express is nagware. It will frequently prompt you to purchase a key supporting development of the system. Registration of $24 is encouraged, but is not a requirement to use Winlink.

Winlink Express interacts with a wide selection of transceivers, provides different operating modes (PACTOR, Packet, Telnet, WINMOR Virtual TNC), and offers different connection methods (relay over mesh and D-STAR networks). It can be operated in any of four general methods:

- **Winlink**: access messages on the CMS via an RF connection to an RMS gateway using the Internet.
- **Peer-to-Peer** (P2P): messages exchanged directly with other users over RF, Internet, or mesh without the use of a RMS or CMS.
- **Radio-only**: messages transferred between HF RMS gateways – without use of the Internet.
- **Telnet Post Office**: connects to the CMS directly over the Internet.

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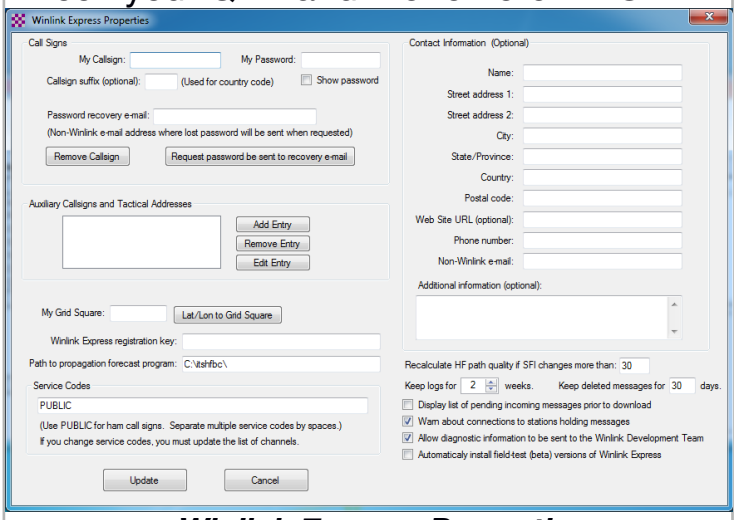
A growing library of forms is available for ARES, RACES, SHARES, or MARS organizations including ICS, ARRL, and form types used in Ohio. The advantage of Winlink versus NBEMS is the ability to exchange messages over the public Internet. A form could be e-mailed directly to a government official instead of being relayed via another ham. Winlink Express makes it easy to fill out or reply to forms by utilizing a local web browser. When composing a message, these forms are found under "Select Template."

A "Query Catalog" accesses services provided by the CMS such as weather and marine forecasts, news, and propagation reports. Location coordinates can be reported through Winlink as well.

Winlink Express will work on a modern computer or Windows tablet running Windows Vista or later. The WINMOR Virtual TNC requires a 700 MHz or greater processor and 512 MB RAM or more due to the Digital Signal Processing (DSP) needed. An Apple or Linux version of Winlink Express is not available but it can be run using a virtual machine or dual-boot configuration. A Linux client is available but does not support all features.

This series primarily focuses on sound card modes over HF, and I will be discussing the WINMOR Virtual TNC. WINMOR is a low-cost interface utilizing the SignaLink USB for $120, as opposed to a PACTOR 3 dedicated hardware modem which can run $1,100 - $1,600. Low-cost hardware means tradeoffs. WINMOR is not anywhere near as fast or reliable as a PACTOR 3 modem, but it does a very good job.

To get started, first go to: **ftp://autoupdate.winlink.org/User%20Programs/**. Download two programs from the list of files: the latest **itshfbc** program and **Winlink_Express_install**. ITS HF Propagation is prediction software to provide a rough estimate of the signal path quality between your QTH and the remote RMS.



Winlink Express Properties

Install both applications, order doesn't matter. Click "next" through both installs, accepting defaults. An Internet connection is required on the computer for initial

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February Hamfests

Feb 18 Intercity ARC. Annual Hamfest. Richland County Fairgrounds, Mansfield, OH. **web:** **http://www.w8we.org**

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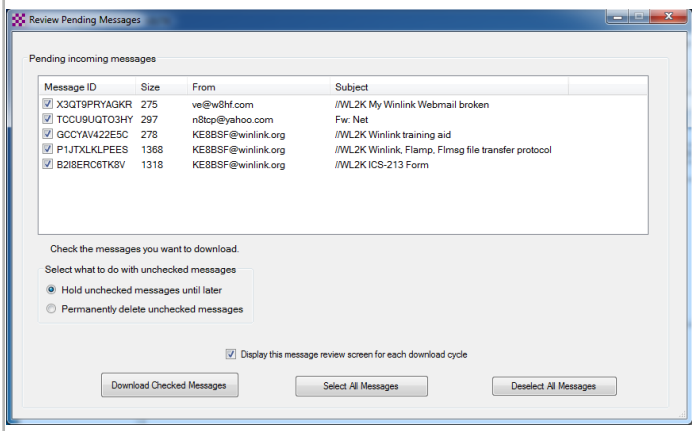
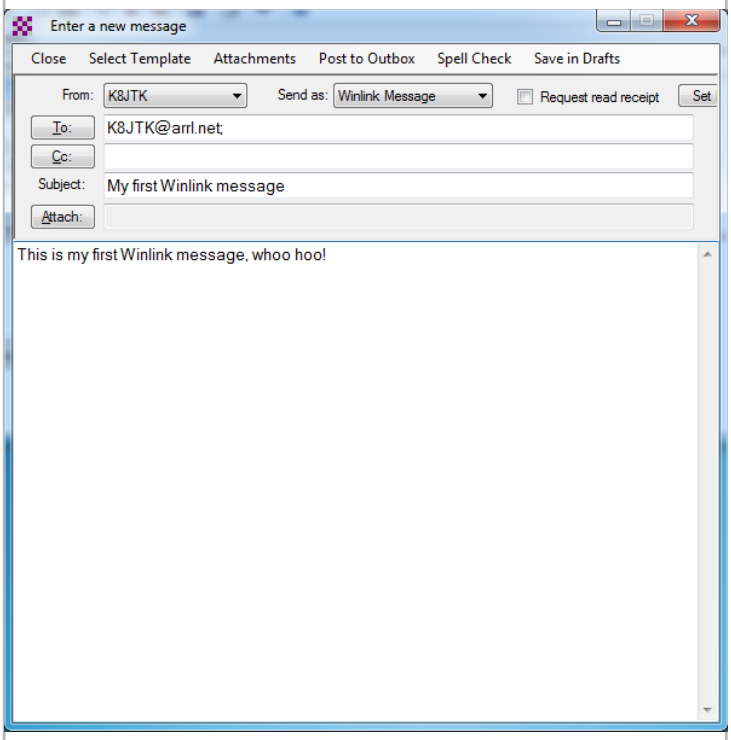
setup. After starting Winlink Express, a "Winlink Express Properties" configuration will be seen. If not, click **Settings**, **Winlink Express Setup**. At a minimum, the following fields must be completed: callsign, choose a password, enter a non-Winlink password recovery email, and grid square. Under **Service Code**, if you plan on using EMCOMM channels, make the code read: **PUBLIC EMCOMM.** I recommend checking **Display** list of pending incoming messages prior to download.

This will display incoming message details prior to download, allowing the user to select or reject messages based on size or sender. Click **Update**. An



Review Pending Messages

account will be setup on the Winlink system. The Winlink e-mail address won't become active until a message is sent through the CMS gateway. Click **Remind Me Later** on any Winlink Express Registration screens. To create a message activating the Winlink e-mail address, click the **New message** icon or click **Message**, **New Message.** In the **To** field, enter your real e-mail address. In the **Subject** field, enter something like "My first Winlink message." In the message body, enter something like: "This is my first Winlink message, whoo hoo!" The message is ready to send, but wait! There is no "send" option. What gives?!? Since this system is store-and-



First Winlink Message

forward, messages are **Post to Outbox** and appear in the "Outbox" System Folder. Messages in the outbox can still be edited, but will be sent when connected to a CMS.

Next to "Open Session," in the drop-down, select **Winmor Winlink**. Click **Open Session**. Two more boxes will appear: "WINMOR WL2K Session" and "WINMOR Setup." The WINMOR WL2K Session box is where an RMS gateway is selected, and it displays the connection status. You will be prompted to select the Capture and Playback sound card devices in the WINMOR Setup box. For the SignaLink, select **USB Audio CODEC**. Leave all other settings at their defaults. Click **Update**. A third "WINMOR Sound Card-TNC" box will appear. This window shows

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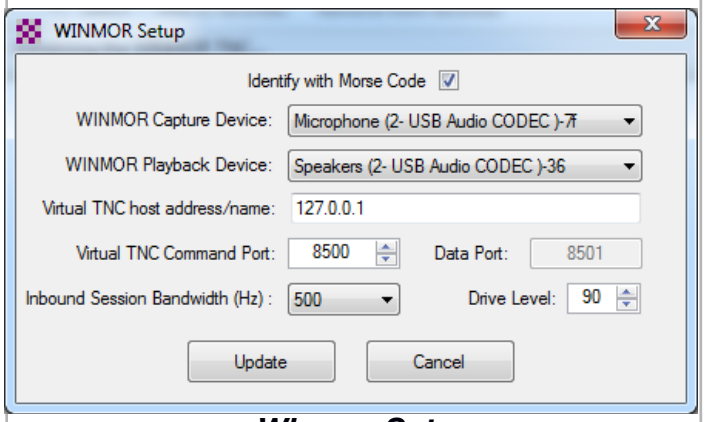
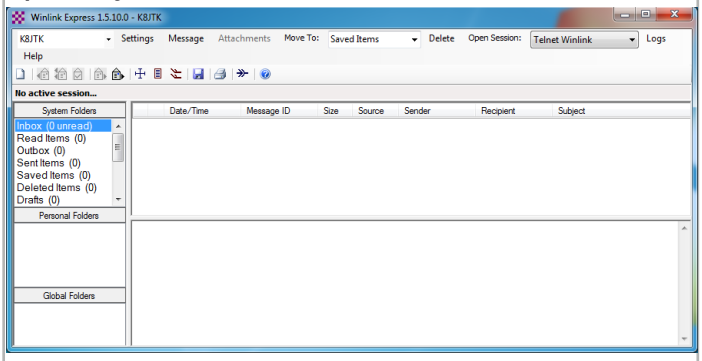
a waterfall along with the transmit and receive state of the virtual TNC. Ignore this box for now.



Winmor Setup

On the SignaLink, begin with the TX and RX volume knobs set to the 12 o'clock position. Set delay (DLY) to the 2nd tick-mark (8 o'clock position).

If you have a way to control your radio through CI-V commands or equivalent, click **Settings**, **Radio Setup**, and configure the settings for the radio. Radio control makes it much easier when selecting different RMS gateway stations. Selecting a different station will automatically change the radio's frequency and mode. With a VOX device



Winlink Express Interface

like the SignaLink, for "PTT Port" select **External**. Click **Update**.

Back in the WINMOR Winlink Session box, click **Channel Selection**. An "HF Channel Selector" window will open. A message will ask to 'update the channel list and recompute the propagation estimates now?' Click **Yes**. If not asked, click **Update Table Via Internet**. This table will update with the current list of Winlink RMS gateway channels on HF. The list can be updated over radio in the future if desired.

Once updated, the presence of color in the "Path Reliability Estimate" and "Path Quality Estimate" columns mean the ITS HF Propagation predictor program is installed and working. Calculations are based on your grid square and solar flux index. Update the current grid square in Winlink Express setup and this table often when traveling. "Mode" is the bandwidth of the RMS node. A higher number means faster transfers are possible. "Hours" means the hours each day the node is online. "00-23" is all day, "02-13" is 02:00 – 13:00. The rest is self-explanatory.

To select a particular RMS gateway, double-click that row in the table. Gateways in green are good choices but ones at the top of the list may not always provide the best connection. Reliable gateways are found by trial and error and can be added to the "Favorites" list. If Rig Control is enabled, the radio should tune to the dial frequency of the RMS gateway and enter USB mode. If not, tune the radio's display frequency to the "Dial Freq" (**VERY important!**) shown in WINMOR. Warm up the Tuner if it needs it. Remember to use no more than 30% power. Click **Start**. If WINMOR thinks the channel is busy, it will prompt to verify you still want to connect because your transmissions may be interfering with another station. Your radio will start pinging the remote RMS gateway station. In the

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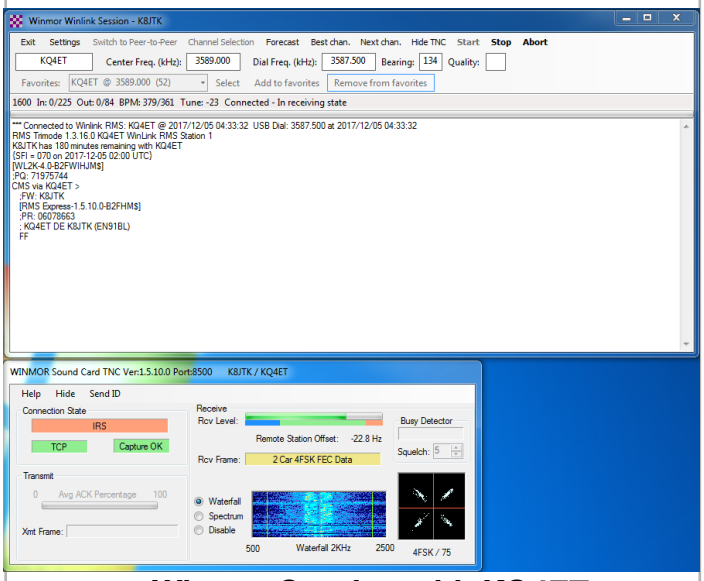
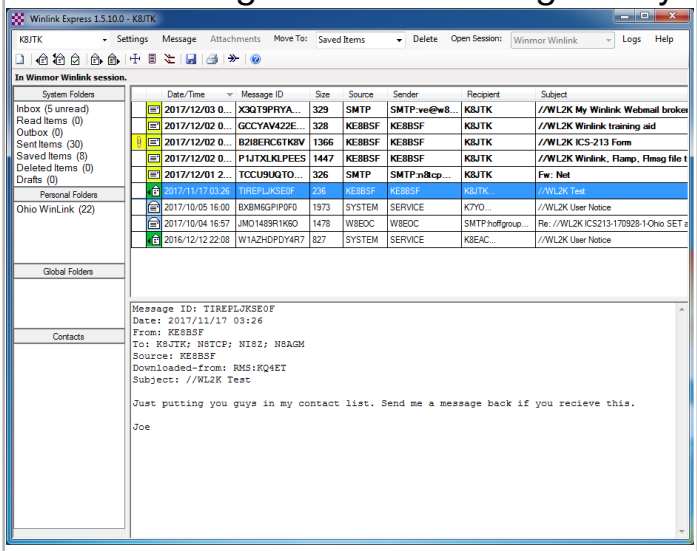
WINMOR Sound Card TNC, above the receive indicator will be the "Measured



Winmor Session with KQ4ET

T>R Latency" value. This measures the transmit/receive turnaround time. It should be less than 250 ms, and is adjustable in part by the SignaLink DLY knob. Higher values will cause problems receiving from the RMS gateway.



Messages Received

While receiving transmissions from the gateway, adjust the RX knob to a level that falls within the green portion of "Rcv Level." With any luck, your client will connect and your first Winlink message will be sent! There will be A LOT of back-and-forth (TX/RX switching) between your radio and remote RMS gateway. These are handshaking and acknowledgments or sending/receiving messages. When all messages are exchanged, the client will automatically disconnect from the RMS gateway. Clicking "Stop" will gracefully disconnect and ID at any time during a session. "Abort" should only be used when something is very wrong because communication is terminated immediately (without ID). Attempts will be made by the RMS to re-establish communication with the client before eventually timing-out.

Once the test message is received in your actual email, your new callsign@winlink.org email address is active! Send a reply to the test message through your real email. To call a different RMS gateway, click **Channel Selection** and select a different station. Wait 5 minutes or so for the reply email to reach the Winlink CMS. Click **Start** in the WINMOR Winlink session box. You will see your reply downloaded to the inbox! When replying to lengthy messages, I will keep a few sentences (paragraph at most) of the original message. This keeps the transmission time down. The original sender can look at the full message in their client sent folder.

Before going crazy by telling people to send messages, there is one more crucial piece to this system. Winlink uses a "whitelist" (approved senders list) approach for external e-mail addresses. This keeps abuse and spam to a minimum. As a Winlink user, you are free to send messages using your Winlink address to other Winlink users. Other Winlink users can do the same, freely contacting you. External

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e-mail addresses are handled very differently. An external e-mail is any mail system other than Winlink (Gmail, Outlook, DACOR, Buckeye Cable, BGSU, etc.). If you first send a Winlink message to someone@someprovider.com, that e-mail address is automatically added to your Winlink whitelist. That means e-mail from someone@someprovider.com will be delivered to your Winlink inbox.

For an external e-mail address to send you a message unsolicited to Winlink, there are two options: add that e-mail to your whitelist ahead of time or the sender must put "**//WL2K**" in the subject line. Example: "//WL2K Holiday Meeting." Anything with //WL2K in the subject is considered a deliverable message and will not be flagged as unauthorized. By default, all outgoing messages have this inserted automatically by Winlink Express. When some individual replies to your message, which would have //WL2K in the subject, it will be accepted. For any non-whitelisted (blacklisted) addresses or messages without //WL2K in the subject, the sender will receive a bounced error message saying "Sender not authorized for any recipient."

Whitelists can be managed by logging on to the Winlink **My Account** page and click **My Whitelist**. That page will provide details on how to update the whitelist using client commands, if desired. Another important detail to remember, is that there is no expectation of privacy with the Winlink system. RMS gateway owners and Winlink administrators can read messages exchanged through the system. They are looking for Part 97 violations and inappropriate usage of the system. Violators will be blocked. I'm sure they would find details of your camping trip fascinating, but they really don't care. E-mail messages through this system are considered 3rd party traffic under Part 97. The e-mail message resides on the CMS until you (a ham) make a connection to another ham's station (RMS) to retrieve your messages. This is similar in nature to passing messages over the National Traffic System (NTS).

The list of services available through the Winlink system is extensive. Winlink is quite flexible, allowing many different ways to access the system over RF, APRS, or Internet. Feel free to send a message to my Winlink e-mail address, K8JTK---at---winlink.org. Replace "---at---" with the appropriate e-mail symbol. Don't forget to include //WL2K in the subject! To find out more information, see:

Winlink website: https://winlink.org/
Introduction presentation: https://www.youtube.com/watch?v=UTx9pY1Akl8
Resource for beginners: https://www.winlink.org/content/getting_started_winlink_and_winmor
System tutorials, documents, and FAQs: https://www.winlink.org/content/winlink_-book_knowledge
Terminology of the system: https://www.winlink.org/glossary. **Winlink over APRS:** https://www.winlink.org/APRSLink ■

AM—from p. 1

modern, or vintage. The **AM Rally website** includes tips and suggestions for various transmitter types as well as links to additional information. The AM Rally gets under way at 0000 UTC on February 3, and concludes at 0700 UTC on February 5. ■

FOR SALE

Elecraft KX3 transceiver and Hardrock 50 W Amp. They go together. KX3 has the ATU, filter board, 2m module, internal bat charger/clock w/ batteries, microphone.

Amp has ATU, QSK. (qsk not installed). Many extra cables & plugs. Includes aluminum stand that will hold KX3 and PX3.
All manuals included.
Price $1300.
Contact:
Bill Wilkins, WD8JWJ, **wd8jwj@amplex.net**

FOR SALE

Heathkit SB-101 transceiver with power supply/speaker (SB-600/ HP-23A)—-receiver works, but no excitation—manuals included.
HD-1416 Code Oscillator with key
HD-15 Hybrid Phone Patch
HM-15 Reflected Power Meter

Asking $200 OBO
Contact:
Betsy Boyle (419) 392-6860 **betsyboylebg@gmail.com**

WOOD COUNTY ARC
P.O.BOX 534
BOWLING GREEN, OH
43402