WINLINK INSTALLATION
& OPERATING GUIDE
Module 2 of 4

Winlink Settings for
ICOM IC-7300 & YAESU FT 991A

Introduction

Effective Emergency Communication (EMCOMM) is predicated upon reliable versatile communication to ensure the timely and accurate exchange of critical information. This is particularly important recognizing traditional communication infrastructure, such as cell towers and internet connections, will most likely be compromised or overloaded during times of crisis. This paper has been written to help OBRA members implement Winlink over HF in their HAM shacks. It does not address other Winlink client solutions such as PAT as only Winlink Express offers the full functionality of Winlink. Neither do we address the setup and implementation of the SCS PACTOR Modem.

VARA TNC is a software-based modem that has gained popularity due to its high performance and accessibility. It offers fast data transfer rates, approaching those of PACTOR 4, but at a fraction of the cost. VARA can be used with any sound card, making it highly versatile and affordable. Additionally, VARA's ease of use and widespread adoption in the amateur radio community make it an attractive choice and is our recommended solution as detailed in this paper.

SCS PACTOR modems are hardware-based solutions that have been the gold standard in EMCOM for many years. PACTOR modems are known for their reliability, high data transfer rates, and ability to handle weak or noisy signals effectively. However, they are also significantly more expensive, the latest costing in the region of $1800 and less accessible than software-based solutions like VARA. Used older SCS PACTOR Modems can be found on E-Bay for around $400.

For our purposes therefore we will focus on implementing Winlink along with the VARA HF TNC.

Winlink e-mail service over HF comprises two Hardware elements, an HF Transceiver and a Windows PC, plus two windows software packages, Winlink Express Client and VARA HF TNC applications. This guide comprises three sections, Section One (this paper) and a PowerPoint slide deck that comprises Sections Two and Three which detail the setup and operation of these components. All three Sections need to be read and followed sequentially.

This paper comprises the setup instructions for the ICOM IC7300 and the Yaesu FT 991A for Data Services focusing on Winlink Express. The first radio we will consider is the most popular in our community, the ICOM IC-7300. This paper provides the essential information to set up your rig within 10 to 15 mins. If you know or discover better settings, please e-mail KY4RY@obxco.com or N4ACT@icloud.com. Similarly, if you have questions regarding these setup data sheets email above for further help.

Both the ICOM IC-7300 and the Yaesu FT991A are Computer Aided Transceivers (CAT) with an integrated quality sound card which means their audio and PTT functions can be controlled by a computer without the need for any additional hardware, e.g., Digirig, Signalink or equivalent.

Fig 1

Audio: Tx, Rx and keying functions are all passed between the PC and radio via a single USB cable greatly simplifying the overall radio integration case Winlink, Express with digital service applications on the PC, in this and VARA. The settings provided here are, valid for other digital modes such as WSJT-X/FT8. is required to connect the radio and PC. A (Printer cable) will suffice; however, it is highly install ferrite chokes on the cable, see Fig 1, as RF

however, equally No special USB cable
standard USB A/B recommended to
pickup can affect computer control. A foil screened USB cable is best but there is no need to purchase 'Special' USB cables that are advertised on the net for this purpose.

First Steps

Neither the IC-7300 or FT991A "Out of the Box" or following a factory reset, are setup for digital services therefore several basic settings need to be changed for data and CAT control. Before making any radio, changes or connecting the radio and PC we need to ensure we have the latest USB driver installed on the PC. The latest driver for the IC 7300, at time of writing, is version 1.03 released in June 2018. You must use this propriety driver, if you connect the radio to a Windows PC, it will most likely auto download a generic driver and will not work giving rise to first level frustration! The latest 7300 Driver can be downloaded from ICOM America website, www.icomamerica.com go to Support, Firmware Download, enter radio 7300 and you will be presented with latest downloads available, ensure you select the latest. In addition to the USB driver, current firmware release dated 2024 is also available for the radio and I recommend always updating firmware to resolve bugs and compatibility issues as ICOM makes releases. Installing updates is straight forward just follow 'Next' prompts, instructions are available on ICOM site. The same process applies to the Yaesu FT991A, www.yaesu.com you need to install the manufacturer's USB driver and not generic driver Windows will install on power up.

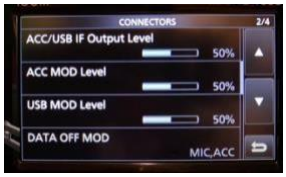
IC-7300 Settings

We need to change the 7300 to pass audio and control via the rear USB rather than MIC as well as other settings to best handle data rather than voice which I will go through here. At the end I will provide in table format the full list of settings for both radios. The screen shots below are for those who are new to the radio or require a little more menu navigation guidance than the 'raw' settings.

1. On the radio select the Menu button (bottom left button on front of radio) and you will be presented with (this screen), the menu screen. Select SET[ings] and from the next screen select Connectors.

2. There are four menu screens under Connectors so from Top Screen 1 these should be your default settings, if you have other settings change to match this screen. Accessory/USB Output level may require lower setting, but you can experiment, 45 – 50 is normal range.

3. On next screen, again default settings should reflect this screen shot, you want to ensure DATA OFF MOD is set to MIC,ACC this will switch input to either Mic or Accessory input when not operating Data modes.



4. On screen 3 we need to set DATA MOD to USB, this is essential for the radio to communicate with the PC via USB cable. Default is probably MIC so will need to be changed.

5. Connectors Screen 4 can be left set to defaults.

6. Now select CI-V[1] menu from Connects screen 3. These are the computer interface settings so critical for how the radio will communicate with the PC and vice versa. Baud rate can be set to Auto, but it's recommended to set as high as possible, however 115200 is recommended. Remember the rate set as you will need to match this in the Winlink set up process. The CI-V address is the Hex address of the radio over the CI-V interface and should be the default 94. In Winlink Express, and most other data applications the IC-7300 is preprogrammed in the application so this address should be left as default 94 which the application expects. CI-V Transceive needs to be set to ON and the last CI-V Remote Transceive Address can be ignored.

7. On screen 2 of the CI-V menu, CI-V Output (for ANT) should be set to OFF. CI-V USB Port = Unlink from REMOTE. Baud Rate, as discussed set to 115200, whatever value you set this to it will need to match the value set in the Data Mode application being

[1] CI-V stands for Computer Interface 5 [Roman numeral "V"] and is ICOM's designation for their rig interface to a computer.

used, in this example 115200. USB Echo Back needs to be set to ON.

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Fig 2: Rear USB Connector

Table: ICOM IC 7300 Winlink Data Settings

Enter: MENU, SET and Function:		
• RF/SQL Control	• Set to Max (11 O'Clock)	This equals the max RF Gain Point
• Time-Out Timer (CI-V)	• 5Min	Page 12-5
SPLIT		
• Quick Split	• On	
• FM SPLIT Offset (HF)	• -0.100MHz	
• FM SPLIT Offset 50M	• -0.500MHZ	
• SPLIT LOCK	• OFF	
TUNER		
• [TUNER] Switch	• AUTO	Forces radio tuning as Winlink changes frequency. Pg 12-5
• PTT Start	• ON	
• RTTY Mark Frequency	• 2125Hz	
• RTTY Shift Width	• 170	
• RTTY Keying Polarity	• Normal	
• SPEECH		No Changes to FUNCTION Sub menus.

Enter: Menu, SET and Connectors:		
• ACC/USB Output Select	• AF	
• ACC/USB AF Output Level	• 41%	Winlink documentation refers to setting drive levels to achieve little or no ALC. ICOM suggests a 1/3 ALC Scale reading. This may require experimentation.
• ACC/USB AF Squelch	• Off (Open)	
• ACC/USB AF Beep/Speech O/P	• Off	
• ACC/USB IF Output Level	• 50%	
• USB MOD Level	• 33%	
• Data OFF MOD	• MIC, ACC	
• Data ON MOD	• USB	Assigns data output to the USB connector
• External Keypad	• Voice – Off • Keyer – Off • RTTY - Off	
CI-V		
• CI-V Output (for ANT)	• Off	
• CI-V USB Port	• Unlink from [Remote]	This setting assigns Winlink keying to the USB cable.
• CI-V USB Baud Rate	• 115200	PACTOR modems and VARA HF TNC's work most efficiently when there are three or four packets loaded into the TNC buffer. Set Dat Rate as high as possible therefore.
• CI-V USB Echo Back	• ON	
USB		

• USB Serial Function	• ON	
USB SEND/Keying		
• USB SEND	• OFF	
• USB Keying (CW)	• OFF	
• USB Keying (RTTY)	• OFF	
• Inhibit Timer at USB Connection	• ON	

NOTE: These settings are valid for using the VARA TNC, if you are using the External SCS PACTOR Modem then communication is passed via the Accessory and not the USB interface.

CI-V USB Port – **UNLINKfrom REMOTE,** the 7300 has two Computer Interfaces, USB and the Remote Jack. If you leave this on, then all Radio Status will be sent over both interfaces but limited to lowest common setting. We are only interested in the USB interface when using any of the Digital Software Packages. i.e., Winlink, so set to **Unlink** this will force radio to only send status information over USB. This also opens additional and higher Baud Rates, e.g. 115200 which are supported over USB only. If you're using the Remote interface on your rig, then you need to set to "Link to Remote'

DATA MOD, this needs to be set to USB for VARA, ACCessory for External PACTOR Modem as comm is via accessory connector.

Baud Rate, you can use 'AUTO' as I say, which means the radio 'should' follow the commands of the MODEM but recommended for VARA to set a 'hard' or fixed rate which should be as high as possible. Just remember it needs to be same on both Radio and Winlink setup when setting hard rate on radio.

USB Echo Back needs to be set to ON for VARA – this will force radio to 'Echo Back' to VARA TNC resident PC. When using PACTOR can be set to OFF as the com or 'Echo Back occurs via the ACCessory connector not USB.

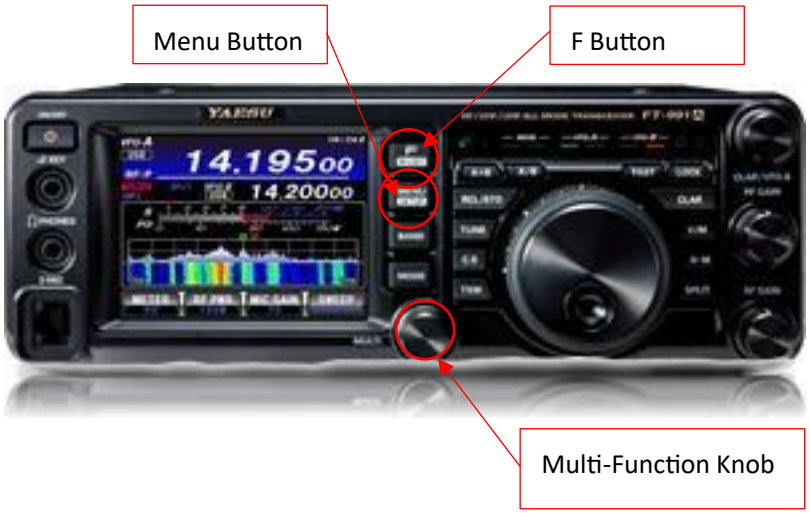
Links:

Winlink.org
Winlink Express download
https://downloads.Winlink.org/User%20Programs/Winlink_Express_install_1-7-17-0.zip

Winlink VARA HF **download**
VARA HF Home page: https://rosmodem.wordpress.com/2017/09/03/vara-hf-modem/

YAESU FT991A Winlink Setup

The Yaesu FT991A has a very similar menu approach to the IC7300 which is accessed through two buttons, the Menu and the 'F' or Function buttons as highlighted below. The Menu button gives access to 153 user definable menu items, you can scroll through the menu using the multi-function knob highlighted below.



The first step is to download the latest Yaesu USB driver and install on your PC. Once installed the radio setup can be done. Access the menu system by pressing the Menu button until 'Menu" screen is presented in bottom half of screen. Rotate the Multi-Function Knob until the required Menu Option is displayed. In our case the first Menu to be changed is **Menu 31 CAT Rate**, this is the rate at which the Radio and Computer will communicate at over the USB cable and should be set as high as possible e.g.,38400bps, in my example I set at 9600bps to be compatible with other data services and not require continuous change. To make changes rotate the multi-function knob until desired menu item is displayed. Then tap the 'Select' soft key on screen to select item and again rotate multi-function knob until required value displayed. Tap on Screen Enter Soft key to save the new setting and as you would assume, when completed all required menu changes pressing the Menu Key will exit the Menu system and all changes are saved, no additional save process is required.

With respect to the F (Function) Key. Pressing this key will present Function Menu on Screen with Forward and Back 'Soft Keys' also on screen to scroll through the available user definable Functions. As with the Menu Items you will need to make several changes to these Functions as detailed in the table below. These changes are straight forward and should take the novice no longer than ten to fifteen minutes to complete including double check verification.

YAESU FT 991A Menu and Function Setting Table

FT-991A Menu Settings		
Menu Item: 031	CAT RATE: 9600 (My Value)	*Select highest rate possible, Note rate set as this will need to be matched in Winlink Setup*
Menu Item: 032	CAT TOT:	Set 100ms
Menu Item: 033	CAT RTS:	Set: Enable
Menu Item: 062	Data Mode:	Set: OTHERS
Menu Item: 064	OTHER DISP (SSB):	Set: 1500HZ
Menu Item: 065	OTHER SHIFT (SSB)	Set: 1500Hz
Menu Item: 066	DATA LCUT FREQ:	Set: OFF
Menu Item: 068	DATA HCUT FREQ:	Set: OFF
Menu Item: 070	DATA IN SELECT:	Set: REAR
Menu Item: 071	DATA PTT SELECT:	Set: RTS
Menu Item: 072	DATA PORT SELECT:	Set: USB
F (-LIST)		
	WIDTH:	3000
	METER:	ALC
	RF PWR:	8 – 50W Start Low & Work up
	WIDTH:	NAR/WIDE: W 3000
	AGC:	Auto
	NB-NOTCH-CONT-DNR-DNF:	Off
	DT GAIN:	6.

** **IMPORTANT** **

The DT Gain defaults to 50! This will overdrive the radio modulator which will cause unwanted audio harmonics. Not good. Turn the DT Gain setting down to about 4, and gradually increase, watching for ALC on the meter as well as the power out that you want. As you move the DT Gain setting back up (higher), you will see your power level increase as well as ALC levels. Find the happy medium of NO ALC showing on the meter. Excessive ALC indication is a sign that the audio drive is too high, and distortion is most likely happening