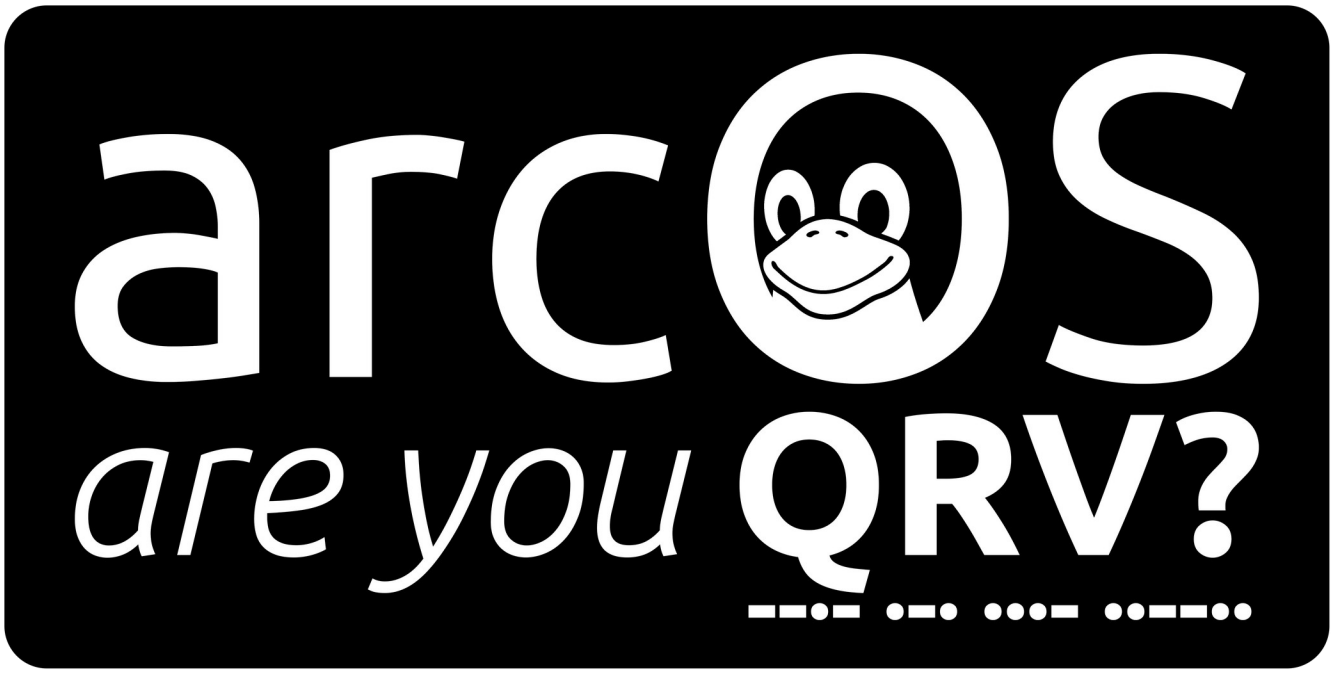

Field Manual

Revised: 2024-10-17

Welcome to arcOS!

The Amateur Radio Community Operating System

INTRODUCTION:

The Amateur Radio Community Operating System is a bootable live Linux distribution installed on a USB drive, and it is built to "just work" with the affordable Digirig device. arcOS is founded on the belief that digital communications within communities of operators can be accessible and easy to use for ALL, regardless of license class or experience.

HARDWARE REQUIREMENTS/RECOMMENDATIONS:

USB Drive
Laptop/Desktop Computer
Digirig Mobile + Cable*
Transceiver
GPS Receiver (optional, but STRONGLY recommended)

Note: While some popular transceivers are equipped with an internal soundcard.* ***arcOS depends on the use of a Digirig Mobile* *device as the computer-to-radio interface. Many of the transceivers with internal soundcards are also supported by one or more Digirig cables. The following list is not exhaustive. Please conduct your own research to find an appropriate cable for your transceiver.*

IC-7300 – Uses the Icom IC-706 cable
FT-991A – Uses the Kenwood TS-480 cable
IC-705 – NO KNOWN SOLUTION FOR USE WITH DIGIRIG

INCLUDED AMATEUR RADIO SOFTWARE:

Direwolf 1.7 (Packet Modem)
ARDOP 1.0.4.1.2 (Soundcard Modem)
Pat 0.16.0 (Winlink Client)
YAAC 1.0-beta203 (APRS Client)
FL-Suite (Multi-mode Soundcard Modem and Additional Tools)
    FLDigi 4.1.20, FLMsg 4.0.17, FLAmp 2.2.07, FLRig 1.4.4, FLArq 4.3.8
WSJT-X 2.5.4 (FT8 Client)
JS8Call 2.2.1-devel (JS8 Client)
*VARA HF 4.8.9 (Soundcard Modems for Windows)
*VARA FM 4.3.8 (Soundcard Modems for Windows)
HamRS 1.0.7 (Logging)
Hamlib 4.3.1 (Rig Control)

**Requires purchase of an unlock key*

CAT/RIG CONTROL:

While arcOS does include FLRig and `rigctl[d]`, and users may save customized settings to take advantage of CAT control, **NO DEVLEOPER SUPPORT FOR CAT/RIG CONTROL WILL BE PROVIDED**. This is for the following reasons:

1) CAT control isolates the operator from their own equipment, often exposing a lack of proficiency when it is not available.

2) CAT control introduces extra complexity with regard to troubleshooting, with which many inexperienced users aren't prepared to engage.

3) Attempting to maintain support for every past, present, and future transceiver is not reliably feasible.

arcOS strives to help operators become proficient with digital modes, without creating "appliance" operators.

SUPPORT:

IRC: arcOS includes Hexchat ("Menu > Internet > Hexchat) as an IRC client for live chat support (or just to hang out and chat with other users). Hexchat is configured to automatically connect to the #arcOS-Linux channel on the Libera.Chat network, and uses the operator callsign as the "nickname" for the user. Come say hi!

GitHub: If you encounter something in arcOS that you believe to be a bug, please consider starting a "Discussion" topic on GitHub.

https://github.com/kg4vdk/arcos-linux-modules/discussions

If the issue is determined to be a bug, an "Issue" ticket can be opened. When reporting issues, please be as detailed as possible. Providing remote support for users is EXTREMELY difficult if a reported issue does not contain information useful for replicating/troubleshooting the issue.

Information to include in any report of a suspected bug:

FULL SYTEM REPORT – Generate a link to your system report using "Menu > System Info", and select "Upload system information". A browser window will open with the text of your system report. DO NOT copy/paste the report. Instead, copy the link from the browser address bar, and include the link in your report.

Information about your station equipment in use
Provide the radio and Digirig version you are using.

Describe the bug
A clear and concise description of what the bug is.

Steps to reproduce the behavior:

1. Go to '...'
2. Click on '....'
3. Scroll down to '....'

4. See error

Expected behavior
A clear and concise description of what you expected to happen.

What actually happened
Include any errors, verbatim.

Screenshots
If applicable, add screenshots to help explain your problem.

Additional context
Add any other context about the problem.

Please DO NOT use Winlink for support requests!

PERSISTENT STORAGE:

The first time arcOS is booted after USB creation, any free space on the USB device is configured as an exFAT filesystem to be used as persistent storage. Any files not saved in this partition will be lost when the system is powered off/rebooted. For a single user, the persistent storage is organized as follows:

```
ARCOS-DATA
   |-Downloads (Common to all users)
   |-QRV
      |-OFFLINE-MAPS (Available to all users, if shared)
      |-CALLSIGN (Specific to the configured user)
          |-SAVED (Base configurations and QRV Profile configurations)
          |-arcos-linux-modules (Updates provided via GitHub)
             |-CORE, COMMUNITY, and USER modules
```

Suggested items to keep in persistent storage:

Checklists for station setup
Radio manuals (your own, plus any common ones that could benefit others)
Frequently used forms
Communication plans (ICS-205)
Frequency lists (including frequently used Winlink gateways)
Contact information

STATION SETUP:

When arcOS is booted, users will be presented with the “Station Setup” window. After supplying some basic information about the operator/station, arcOS will be configured for “out-of-the-box” use with any transceiver compatible with the Digirig device. For users outside the United States, please treat the “State” field appropriately for your locale (e.g. province, territory, etc.). Once your station is ready for use, you will receive a notification that “CALLSIGN is QRV!”

Note: “QRV” is Amateur Radio shorthand for “I am ready!”

QRV MODULES:

QRV Modules are included in the ISO image, and are updated occasionally with fixes, improvements, and features. When an update for the QRV Modules is available, users will be notified by the appearance of an icon (🔄) in the "System Information" display at the bottom right of the desktop window. To update the QRV Modules, use "Menu > arcOS Tools > Update QRV Modules." When the "Station Setup" information is provided, the scripts provided by the QRV Modules are run in the following order:

1) CORE Modules
2) COMMUNITY Modules
3) USER Modules

CORE MODULES:

The CORE Modules provide basic functionality for the included Amateur Radio software. They should not be modified by users, and any user-made changes will be overwritten when the modules are updated.

COMMUNITY MODULES:

The COMMUNITY Modules can provide useful functionality for clubs or other groups of operators. Changes to these modules will also be overwritten when the QRV Modules are updated. No COMMUNITY Modules are "active" by default. Each module in this category contains a module script in its directory (`00_MODULE-NAME.sh`). To activate a COMMUNITY Module, simply move the module script UP one level. For example:

```
COMMUNITY
   |-LARGE-PRINT
      |-00_LARGE-PRINT.sh (NOT ACTIVE, inside LARGE-PRINT directory)

COMMUNITY
   |-00_LARGE-PRINT.sh (ACTIVE, up one level from LARGE-PRINT directory)
   |-LARGE-PRINT
```

Activated COMMUNITY Modules are "remembered" during a QRV Module update, and re-activated once the modules are up to date. Users can re-number the module scripts, in the case that particular ordering is desired.

USER MODULES:

USER Modules can be used to personalize the system appearance, customize system preferences, install software, or do just about anything a user wants to do at the "Station Setup" runtime. This can be especially useful if users pre-download software packages, and install them with a script in the USER Modules directory.

PERSONALIZATION:

The desktop background image can be personalized by placing any JPEG image in the `ARCOS-DATA/QRV/CALLSIGN` directory, and naming it "`wallpaper.jpg`."

The system color scheme can be adjusted by using a simple USER Module script:

QRV PROFILES:

The last field of the "Station Setup" window allows for selection of a "QRV Profile." This is useful for deploying saved configurations for differing scenarios. Most of the

configurations for the included Amateur Radio software are savable via right-clicking the application icon in the bottom panel (or via “Menu > arcOS Tools > SAVE APPNAME CONFIG”). When saving an application’s configuration, users will be presented with the option to input a custom “QRV Profile” name. If no custom name is provided, the configuration will be saved to a profile named “DEFAULT”. Once a profile has been created, it will be available in the dropdown menu during “Station Setup.” To switch between profiles, it is usually sufficient to simply re-run the “Station Setup” from the main menu.

Example:

A user saves their Pat configuration (with password) to the “DEFAULT” profile. They also save their YAAC configuration (with icon, beacon, and SSID) to a profile named “MOBILE”. When they run “Station Setup” and select “MOBILE”, YAAC will be setup using this “MOBILE” profile, Pat will use the “DEFAULT” profile configuration, and all other application will use the base configuration in arcOS (the “NONE” profile).

UNLOCK KEYS:

In order for VARA modems to function on Linux systems, Wine is required to emulate a Windows environment. In addition to being designed for Windows, VARA is NOT open source. Considerable effort is involved in ensuring reliable functioning of this software in arcOS. For users desiring to use the VARA modems, an unlock key is available for purchase at https://arcos-linux.com. **Without an unlock key, Wine and VARA modems WILL NOT function**. All other software will function without an unlock key. If you have purchased an unlock key, you will receive a confirmation email notifying you your callsign has been added. Once you have received this email, use “Menu > arcOS Tools > Download arcOS Keys” to download the key file to your persistent storage.

Note: If the “Station Setup” is run before the key file is present on the system, a reboot is required to allow arcOS to validate the supplied callsign at “Station Setup” runtime. Only downloading the key file requires an internet connection. Once the key file is downloaded, validation takes place on the local system. Installation of VARA modems, likewise, do not require an internet connection.

VARA REGISTRATION:

During the initial VARA installation process, users are prompted to enter their VARA Registration Code. If a registration code is not provided, VARA will operate in a “trial mode.” If a user later desires to purchase a registration code for VARA, it can be entered in the “LICENSE” file located in the `/ARCOS-DATA/QRV/CALLSIGN/SAVED/VARA-[FM,HF]` directory.

NETWORKS:

Configurations for wi-fi (or wired) networks can be saved using “Menu > arcOS Tools > SAVE WIFI CONNECTION”. If a saved wi-fi connection is available, arcOS will automatically connect to it. This can also be used to save information like static IP addresses.

GPS TIME SYNC:

By default, arcOS is configured to use an attached GPS as a time source if no network time server is available. If GPS is actively being used as the time source, a clock icon will be displayed next to the coordinates and gridsquare in the System Information display at the bottom right of the desktop

SOUND:

arcOS can save the preferred system and Digirig sound levels on a per machine basis (using the serial number of the machine on which arcOS is booted). To adjust the system sound levels, simply use the speaker icon in the system tray (bottom right panel area). To adjust the Digirig sound levels, you can open a terminal and use alsamixer. Press F6 to select the "USB PnP Sound Device", then use the up/down arrow keys to adjust the levels for the "Speaker" and the "Mic" (labeled "Capture"). Once you have set the audio levels as desired, press "ESC" to exit `alsamixer`. To save the sound settings persistently, use "Menu > arcOS Tools > SAVE SOUND CONFIG".

PAT WINLINK:

Save Password: To easily save the Winlink password for your callsign, right-click on the "PAT WLNK" icon in the bottom panel and select "SET PAT WLNK PASSWORD". This will set the password for this session. To save the password persistently, right-click the "PAT WLNK" icon and select "SAVE PAT WLNK CONFIG", and choose the "DEFAULT" profile or another profile name as appropriate for your use case. If you choose not to save your Winlink password, you'll simply be prompted to provide it when connecting to a gateway.

Connect to a Gateway (Send/Retrieve Messages): Make a connection to a Winlink gateway by selecting "Action > Connect" from the top menu. Then, choose the desired transport method, and ensure the relevant modem is running. Input the desired target gateway callsign and SSID. Select "Connect".

RMS List: The RMS List is a record of active Winlink gateways, which provides the callsign, distance from your station, mode, and frequency used by the gateway.

Update RMS List: arcOS saves the RMS list in persistent storage, and you can update it by using "Action > Connect", "Show RMS list", and selecting "Update cache".

Position Reports/Requests: To **send a position report** in Pat, select "Action > Position" from the top menu. If a GPS device is attached, and has a location fix, the latitude and longitude will be auto-populated. Network based geolocation can provide coordinates, however the accuracy is dependent on your ISP. Otherwise, you can manually enter your location's coordinates. Include a comment relevant to your scenario. Once ready, select "Post", and the position report will be placed in your Pat outbox.

To **request position reports** sent by other stations, you have a few options. Each of these methods requires composing a simple message. Using the top menu in Pat, select "Action > Compose".

Request 30 Nearest Reports from the Last 10 Days:

```
TO: INQUIRY
SUBJ: REQUEST
BODY: WL2K_NEARBY
```

Request Last Report from a Single Station:

```
TO: QTH
SUBJ: POSITION REQUEST
BODY: CALLSIGN
```

Request Last *N* Reports from a Single Station:

```
TO: QTH
SUBJ: POSITION REQUEST
BODY: CALLSIGN N
```

Once your request message is composed, follow the steps above to connect to a Winlink gateway.

Peer-To-Peer (P2P): In arcOS, Pat is configured by default to "listen" for P2P connections on each of the included modems. P2P connections, as the name suggests, do not require the use of a gateway. In order to send/receive a P2P message, the other station must also be configured properly. Only the callsign of the other station is needed (do not include "@winlink.org"). When composing the message, ensure that the "P2P Only" box is checked. Select the desired transport method (must be in use by both stations), and enter their callsign as the target, and select "Connect".

YAAC:

Offline maps for use in YAAC can be downloaded from within YAAC. From the main menu in YAAC, select "File > OpenStreetMap > Download Pre-Imported Tiles". If a GPS is connected, and has a valid location fix, YAAC will automatically use your position as the center point for the specified radius. If no GPS is available, you can manually enter your desired coordinates.

HAMRS:

When using HAMRS for logging, please ensure that you export any important logs to persistent storage, or use "Menu > arcOS Tools > SAVE HAMRS LOGS" to prevent loss of logged contacts.

FILE SHARING:

Warpinator is included in arcOS for file sharing over a local network. Warpinator is configured with the group code "arcOS" to enable the ability to utilize compression when sharing files. If sharing files with non-arcOS users, you may need to change the group code for the session. You can do this from within Warpinator by using the menu icon (top left), and selecting "Preferences", and changing the Group Code on the "Connection" tab.

DESKTOP SHARING:

X11VNC provides the ability to share/control your arcOS machine from another arcOS machine, or any machine with a compatible VNC client. Desktop sharing can be enabled/disabled using "Menu > arcOS Tools > Enable/Disable Desktop Sharing". A notification will be displayed with the address to use on the remote machine for the connection. In addition, an icon will be placed next to the IP address in the Station Information display on the bottom right of the desktop to indicate that Desktop Sharing is active.

NOTES