

piWebCAT - Getting started

Micro SD card - **preconfigured** (configuration details in sections 14.4, 14.5, 14.6)

- Raspberry Pi operating system with bundled software (eg: Libre Office, Real VNC server).
- Apache webserver, PHP 7 server code, Pure-FTPd FTP server.
- MariaDB (MySQL) database server. PHPMyadmin, piWebCAT 'RADIOS' database.
- Mumble VOIP (Voice over IP) server and client.
- Hamlib API system providing control of 250 radios using a common command set.
- piWebCAT 'web-server': G3VPX code, phpGrid , piWebCAT website on the help button.

Access details

- IP address 192.168.1.117 configured for wired LAN (eth0) and wifi (wlan0).
Can be changed by editing /etc/dhcpd.conf.
- FTP access – From FTP client on PC (eg: FileZilla) or from Microsoft Expression 4 or other development system.
host = 192.168.1.117, port = 21, password: feline.
users: upload to access web root at /var/www/html
piuser to access /home/pi (has subfolder Downloads for Hamlib building)
- MySQL – eg: using MySQL Front: host = 192.168.1.117, port = 3306, user = piwebcat, pw = feline
- VNC Viewer (Use PC as mouse, keyboard and monitor)
host = 192.168.1.117, port = 5900, user = pi, pw = feline
- Mumble - server and client up and running from Micro SD card, configured for PiHut USB audio adapter.
- See section 10 – Mumble and also 14.7 – Mumble client on PC, 14.8 – Mumble client in Android.

Download / buy - optional but suggested

- PC - Download MySQL Front, VNC Viewer, Mumble client, FileZilla, Win32DiskImager. (all free)
- USB audio adapter – PiHUT (£4) (- for Mumble VOIP)
- piZERO RS232 card or G3VPX piWebCAT card for CI-V/RS232 (bare card) ... not needed for USB connections.
- A USB3 micro SD card reader for card cloning (So very much faster than USB2 offerings!!)
- Optional spare micro SD card ... buy fast class 10 for fast operation in piWebCAT and fast copying with Win32DiskImager plus USB3 adapter.
- RPi real time clock – to set real time if you want logging with no internet connection.

Starting with piWebCAT

Access the RPi with keyboard , mouse and monitor OR (preferably) use VNC viewer.

- You need to run Hamlib rigctl in RPi terminal to find the Hamlib number for your radio. Section 8.2

To change the IP address, edit /etc/dhcpd.conf . You may need to change the router IP if it is not 192.168.1.1

Access piWebCAT by simply entering 192.168.1.117 into a web browser.

Click the Config button. Spend some time studying the configuration tables for different rigs.

Examine the **rigs** table:

Hamlib - rigctl and rigtld

Hamlib provides an API / database supporting CAT control of 250 radios. (API = Application Programming Interface)

Hamlib can be downloaded from GitHub by an internet search on GitHub Hamlib.

The download is Hamlib-master.zip into RPi folder: /home/pi/Downloads from where the system is built.

The whole download / build process is described in section 14.5. (You don't have to register just to get the downloads.)

During the past 8 months of developing with Hamlib, I have observed a fairly intense, ongoing development effort with many changes and bug-fixes, particularly for very recent radios. This is mostly by Mike, W9MDB. Mike doesn't have all 250 radios, and so the process, particularly with new radios is very dependent on user feedback. In my case, the FTdx101D was new and there were multiple issues in its initial Hamlib provision which I guess was done from the CAT manual without a radio to test on.

Mike wanted the issues corrected so that the Hamlib provision was fit for purpose. I wanted them corrected to develop piWebCAT with the FTdx101D. So there was mutual benefit in our cooperation.

You can at any time download and install the latest version of Hamlib. If there are issues, then raise them with me or preferably with Hamlib by registering on GitHub. I can't test them I don't have your rig!! Note section: 8.18 on Hamlib log generation.

I have left on the micro SD card the download of Hamlib-master.zip that I used to install Hamlib before sending out the card. I have renamed it with its date added to the filename. This has two purposes:

- A new download will not overwrite it.
- If a new download /installation has problems for your radio, then you can revert to the earlier download.

I suggest keeping a renamed copy of any OK download that you are using. (You can off-load to PC with FileZilla)

Rigs table

The database contains thirteen configured radios:

- Five demonstrating direct CAT control from piWebCAT for specific radios (eg: FTdx101D, IC7000)
- Two using Hamlib for specific radios (ie: FTdx101D and IC7000)
- A Hamlib generic progression of three radios using –vfo mode. – see below.
- A Hamlib generic progression of three radios NOT using –vfo mode.

Note in particular the following fields (columns):

- **hamlib** This is the Hamlib number for your radio see 8.2
- **vfomode** Whether Hamlib runs in –vfo dual VFO mode. Important before you start with Hamlib – see below.
- **catcomms** ASCII, YAESU5 or CIV for direct piWebCAT CAT data OR HAMLIB using the Hamlib API.

Dual VFO issues *Whether we send to server VFO id A or B or just X ? and whether we use Hamlib –vfo mode ?*

This is an important initial decision when designing /choosing a configuration – both for Hamlib and piWebCAT direct CAT. The details given here may seem a little excessive for a quick start guide, but it is fundamental to correct multi VFO operation.

Examine the rigs table on the micro SD card. The Hamlib configurations are suffixed –H eg: IC7000-H.

- IC7000-H and Transceiver-H-A-NV, Transceiver-H-B-NV and Transceiver-H-C-NV do *not* use –vfo mode
- FTdx101D and Transceiver-H-A, Transceiver-H-B and Transceiver-H-C do use –vfo mode

The FTdx101D has two completely separate receivers. They have their own separate roofing filters, preamps, attenuators. There are therefore a large number of receiver parameters that CAT control has to set separately for each receiver, eg: frequency, NR on/off, NR level, IF width, IF shift, preamp, atten. etc, etc

The **FTdx101D** manual shows a separate set of CAT commands for each receiver .

The commands are essentially the same but with a 0 or 1 character specifying Main or Sub (= VFOA or VFOB in other radios). *piWebCAT's displayed user interface accesses only the currently selected receiver. Therefore:*

- The client (browser) needs to specify Main or Sub to the server. It therefore has controls configured with **vx = V**. This makes it send VFO identity to the RPi server with URL parameter **abx = A** or **B** (for VFOA/VFOB or Main/Sub) The server configuration has to have two separate corresponding CAT command records, - one with **abx = A** containing the Main receiver CAT command and one with **abx = B** containing the Sub command.
- Hamlib needs to be configured in –vfo mode which requires a VFO parameter in every command:
eg: \get_freq Main \set_freq Sub etc. But also \set_level Main RFPOWER ... even though not VFO specific.

The **Icom IC7000**, most Icom radios and several others do not have separate CAT commands for VFOA and VFOB.

We cannot control the 'background' VFO. There is just one CAT command set which acts on the currently selected VFO

- This means that the server needs only one record for each command ... which will act on the current VFO. This record is labelled with **abx = X** (rather than with A or B) There is no point in the web client sending current VFO identity to the server. Client controls are therefore configured with **vx = X**. The command is sent to the server with URL parameter **abx = X**
- Hamlib is not configured in –vfo mode. Commands have no VFO parameter, ie: \get_freq \set_freq 3700000 \get_level RFPOWER etc

So – if you are using one of my configurations as a starting template, choose a template appropriate to your radio's CAT design in relation to VFO access.

Database editing, cloning etc (Using downloaded MySQL Front and piWebCAT SQL library)

This is described in detail in sections 3.13 – 3.17.

Getting started with your rig

Starting with an empty configuration

You could start with a new unconfigured rig.

You add the rig to the rigs table. You define its name which will be the link between all its configuration records

Use a name such as IC706 or for a Hamlib configuration, IC706-H. Be sure to set vfomode = Y or N as discussed above.

Define a description which will appear in the drop list rig selector.

Set the **catcomms** field – this will define which tables are presented to you for buttons, sliders, catcodes and meter.

Select your rig in the drop list selector. Any new records created in the tables will then have the rig name automatically inserted – thereby avoiding misspelling of this essential link field.

Using an existing rig / Template

I guess most people will prefer to use an existing configuration.

One of the two Hamlib learning sequences may be your choice (one with and one without –vfo mode)

These learning sequences were built up on my FTdx101D (--vfo mode) and my IC7000 (NOT –vfo mode)

I have attempted to limit them to Hamlib commands which would appear in most rigs.

Note that these –vfo mode configurations have Main / Sub changed to VFOA /VFOB. Change them back to Main / Sub for a modern Yaesu rig.

However, some commands may be illegal for your rig and piWebCAT may keep pausing for a second or two on timeouts.

To deal with this – please see the YouTube video link on the website front page.

Also, manual / website sections: 2.19: Using web-browser diagnostic.

If you use the learning sequences and get the third (C) configuration running ok, you may then want to add more controls.

At this point, I suggest cloning the configuration so that it has the correct name before moving forward.

There are cloning scripts in my supplied SQL library. See sections 3.13 - 3.17.

Browser issues - memory leaks see section 3.19 - Browser choice, memory leaks.

In the absence of user action, piWebCat's background activity continues with S-meter reads, and control sync actions.

This generates in the order of 20 URL messages + responses per second between web browser and RPi server.

By contrast, many web applications send nothing until you hit a key!

As a result of this intense activity, piWebCAT slows after 1 -2 hours with my fast i7 PC. (seemingly more gradual on a slower PC!)

The underlying issues are well documented and vary between browsers. Internet gurus do not offer a total fix.

Javascript memory leaks are part of the problem and my design has taken on board all relevant advice here.

The saviour is the green **Reset** button. This restarts client javascript without clearing the window or removing any popups.

piWebCAT is running again within 5 seconds and without any effect on the rig.

Ian Sumner

G3VPX

16th Feb 2021