FLRIG Users Manual

1.3

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Contents

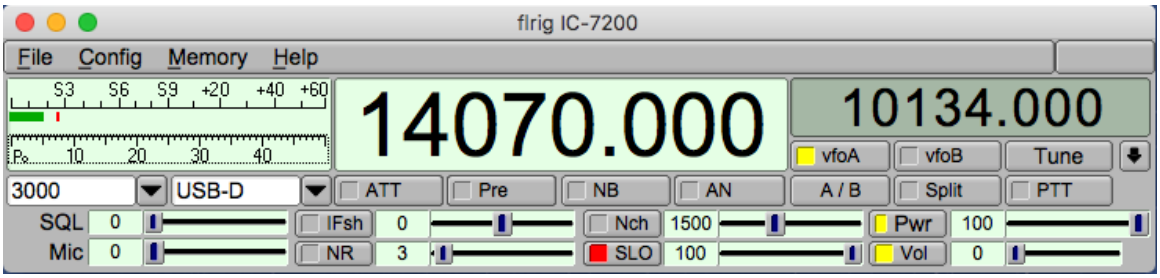
Chapter 1

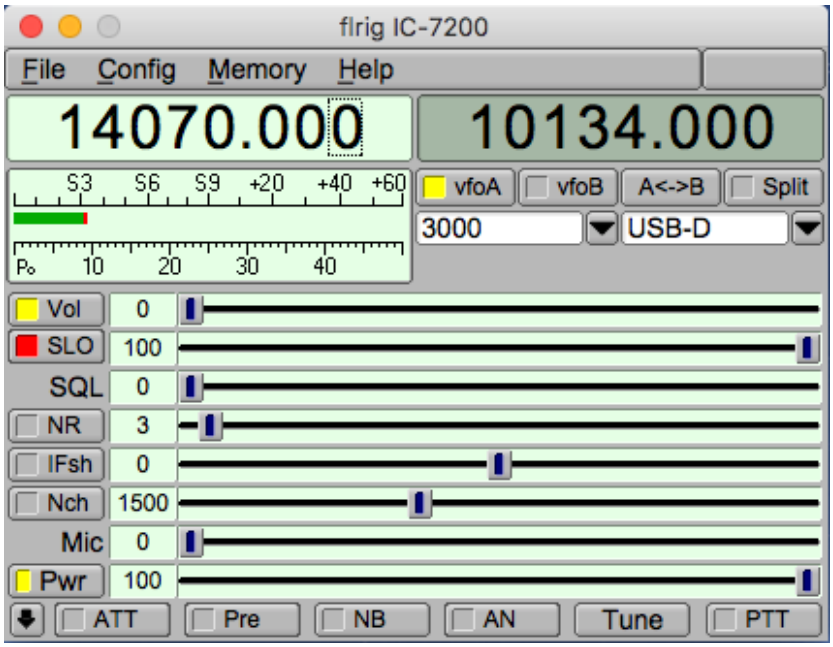
FLRIG Users Manual - Version 1.3

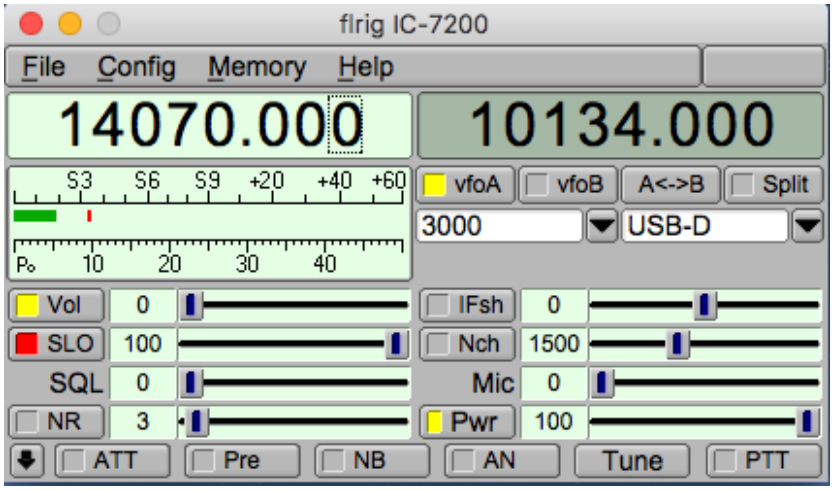
1.1 Transceiver Control

FLRIG is a transceiver control program designed to be used either stand alone or as an adjunct to FLDIGI. The supported transceivers all have some degree of CAT. The FLRIG user interface changes to accommodate the degree of CAT support available for the transceiver in use.

Three different main dialog aspect ratios can be selected to suit the computer screen dimensions and operator preferences. The wide aspect ratio can be resized horizontally. The narrow aspect ratios are fixed in width and height.







A fourth interface is available for all transceivers. It is suitable for use on a touch screen

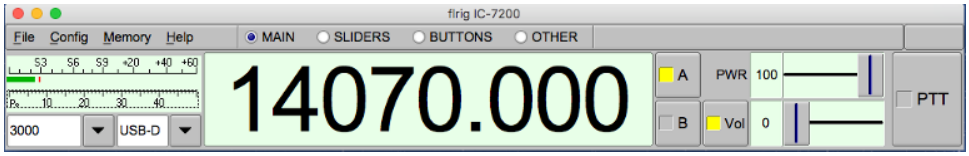


Figure 1.1 Shown at 75% of full size

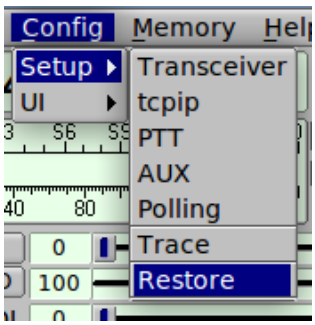
The back end control code for each transceiver is unique to FLRIG. No additional libraries or definition files are required.

1.2 Supported Transceivers

Elecraft	Icom	Kenwood	Ten-Tec	Yaesu	Other
K2	IC-703	TS 140	TT 516	FT 100D	PCR 1000
K3	IC 706 MK IIG	TS 450	TT 535	FT-450	RAY 152
KX3	IC-718	TS 480HX	TT 538	FT-450D	
	IC 728	TS 480SAT	TT 550	FT 747GX	
	IC 735	TS 570	TT 563	FT 767	
	IC 746	TS 590S	TT 566	FT 817	
	IC 746 Pro	TS 590SG	TT 588	FT 847	
	IC 756 Pro II	TS 990	TT 599	FT 857D	
	IC 756 Pro III	TS 2000		FT 897D	
	IC 910H			FT-950	
	IC 7000			FT-1000MP	
	IC 7100			FT 2000	
	IC 7200			FTdx1200	
	IC 7300			FTdx3000	
	IC 7410			FTdx3000	
	IC 7600				
	IC 7700				
	IC 9100				

1.3 Setup

Select the transceiver with the "Config / Setup / Transceiver" menu item.



Each of the menu items will open the configuration dialog to the respecive tab:

- **Transceiver** - select transceiver and configure serial i/o parameters
- **tcpip** - configure interface to a remote tcpip/serial controlled transceiver
- **PTT** - configure separate PTT serial ports (if used)
- **AUX** - configure separate auxiliary serial ports (if used)
- **Polling** - select and configure transceiver parameters to poll
- **Trace** - select and display program execution paths
- **Restore** - select and configure transceiver parameters to read and restore

1.3.1 Xcvr Select

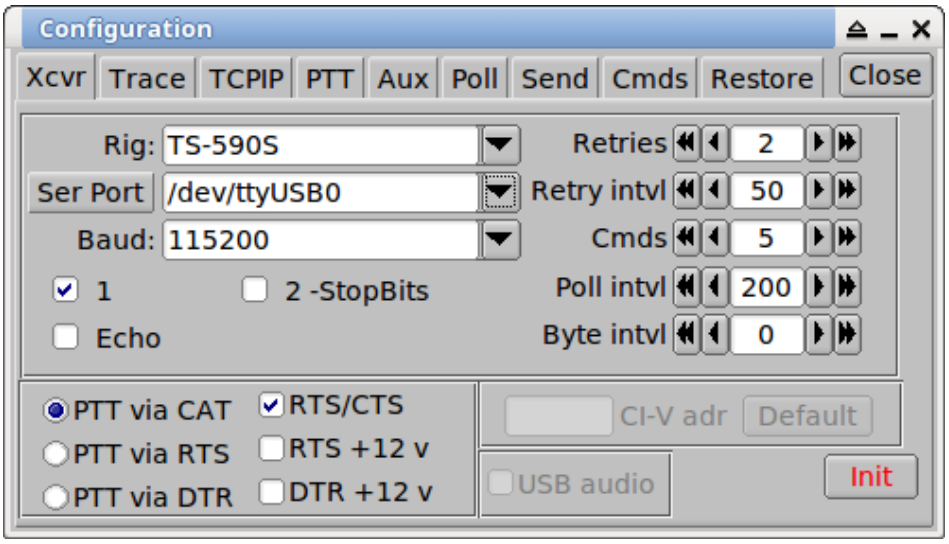


Figure 1.2 I/O Ports - Xcvr

Select the rig in use from the "Rig" combo box.

The default values associated with that transceiver will be preset for you. These have been verified by the test team but might require some tweaking for your particular h/w.

You may prefer to use h/w PTT signaling instead of CAT PTT. Not all transceivers support the CAT PTT function, but it will be preset to on if the selected transceiver supports that command. The h/w PTT may be shared with the CAT serial port.

If your serial connection is a CI-V device you might need to check "Echo" and also set either RTS or DTR to +12 if CI-V power is derived from the serial port.

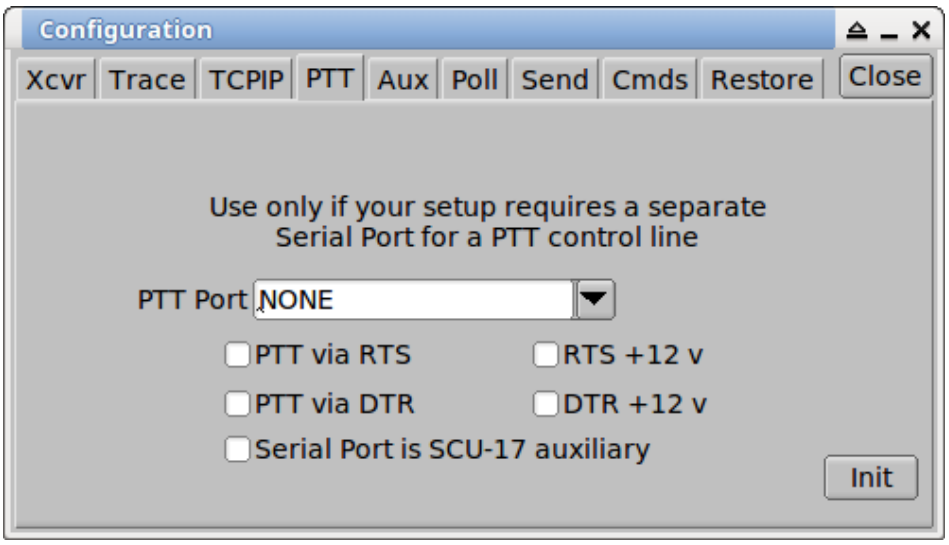


Figure 1.3 I/O Ports - PTT

Your PTT h/w control may also make use of a second serial port. If that port is the secondary serial port of the SCU-17 then you must also enable the "Serial Port is SCU-17 auxiliary" control.

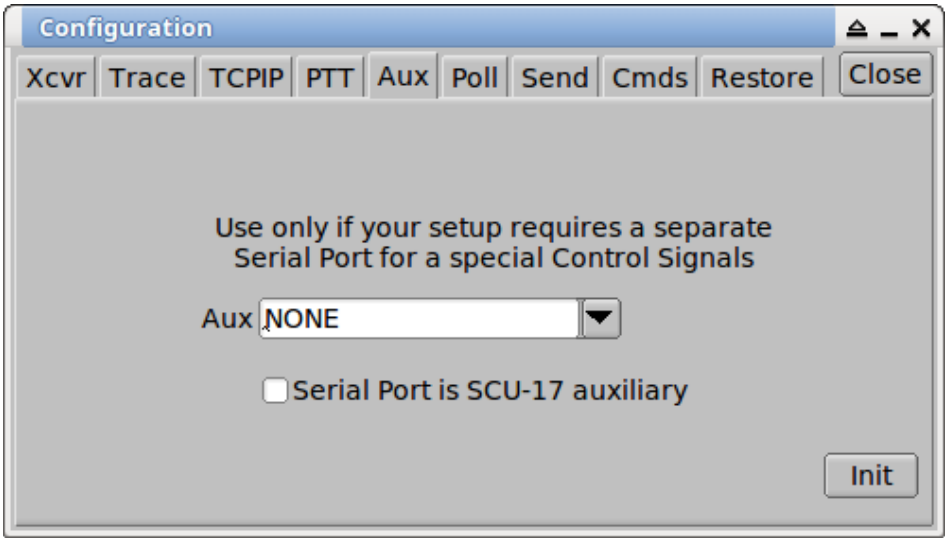


Figure 1.4 I/O Ports - Aux

Figure 1.5 Aux Controls

You might also need access to special h/w functions. FLRIG provides this via the DTR and RTS signal lines of an independent serial port. Additional main dialog controls are enabled and shown if you select anything other than NONE (the default) on this tab. Enable the "Serial Port is SCU-17 auxiliary" if you are using the SCU-17 secondary serial port.

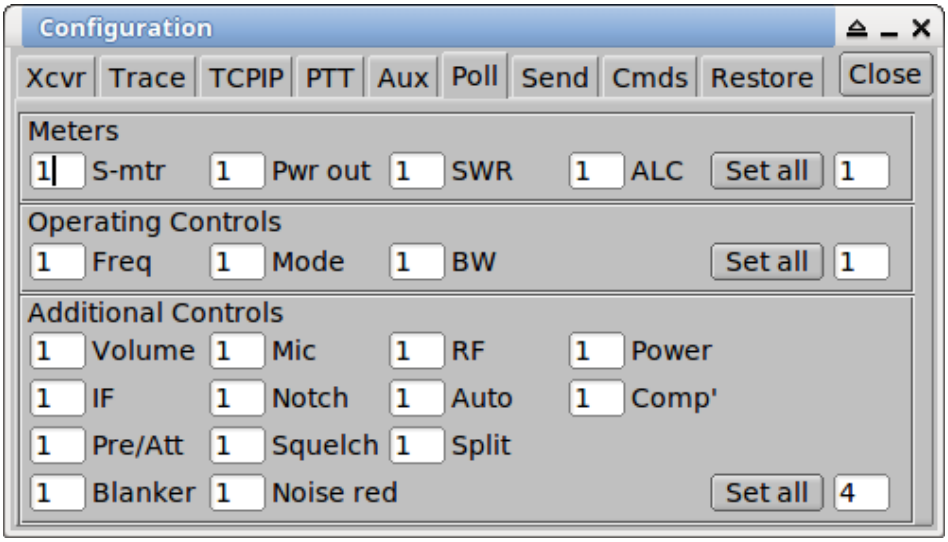


Figure 1.6 I/O Ports - Polling

Providing you transceiver supports the various meters and controls, you can elect to poll these every time the poll cycle occurs. Polling a value causes FLRIG to follow and well as control a particular transceiver function or control. The polling cycle will slow down as you elect to poll more and more values.

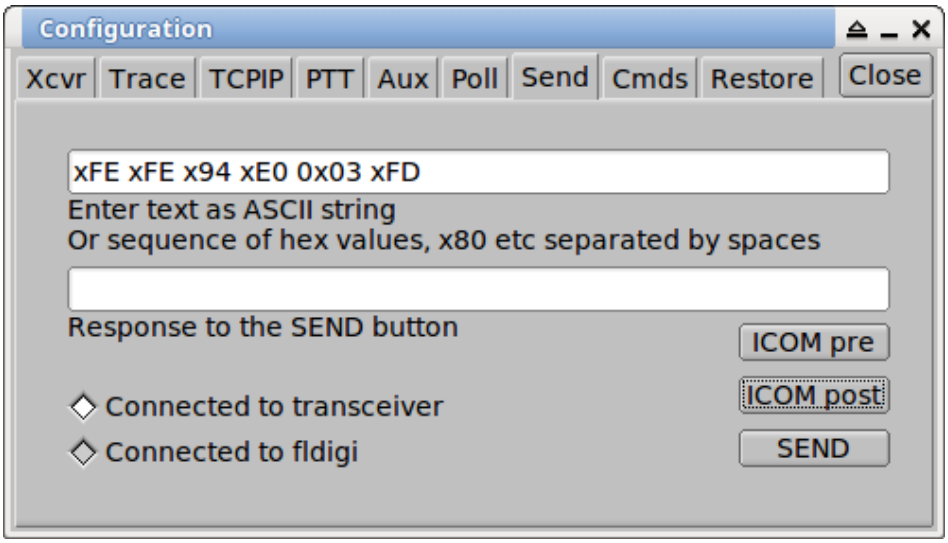


Figure 1.7 I/O Ports - Polling

Testing your transceiver commands. FLRIG might not support a particular CAT command for your transceiver. You can test the support for a particular command using the "Send Cmd" tab. The command string must comply with the transceiver requirements. If ASCII text is used, as with transceivers based on the Kenwood command set you enter the string without spaces, i.e.

```
FA;
```

to read the A vfo .

For binary strings, used in older Yaesu transceivers, and all Icom CI-V type transceivers you need to enter the string as space delineated hex values, i.e.

```
Yaesu:  x00 x00 x00 x01 x05

Icom: xFE xFE x70 xE0 x1A x05 x00 x92 x00 xFD
```

The buttone "ICOM pre" and "ICOM post" will insert the preamble and postamble hex code sequences for the selected Icom transceiver.

Press the SEND button to transfer the command to the transceiver. The response will appear in the lower text control.

The diamond indicators will be lit for transceiver and fldigi connections respectively.

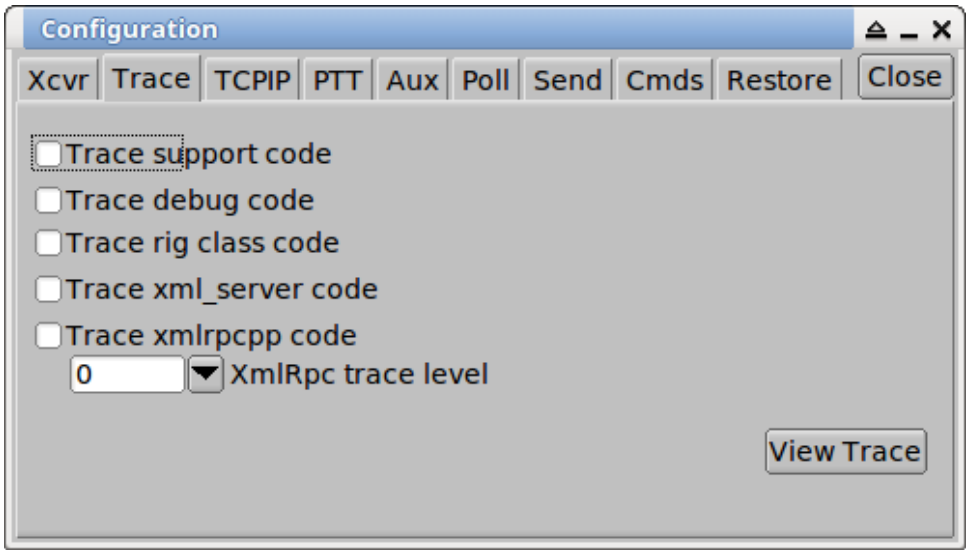


Figure 1.8 Configure code execution trace

Several debugging tools are available in flrig, including the ability to observe code execution in various parts of the program. The trace tool sends time annotated data to both a viewing dialog and a file named "trace.txt" which is written to the flrig files folder.

- Trace support code - main processing loop execution points
- Trace debug code - replicate the event log debugging output
- Trace rig class code - execution points within a specific transceiver class (not for all)

- Trace xml_server code - execution points within the xmlrpc interface code for i/o to/from fldigi

- Trace xmlrpcpp code - sent and received xmlrpc data packets
  six levels of detail 0 ... 5 can be specified

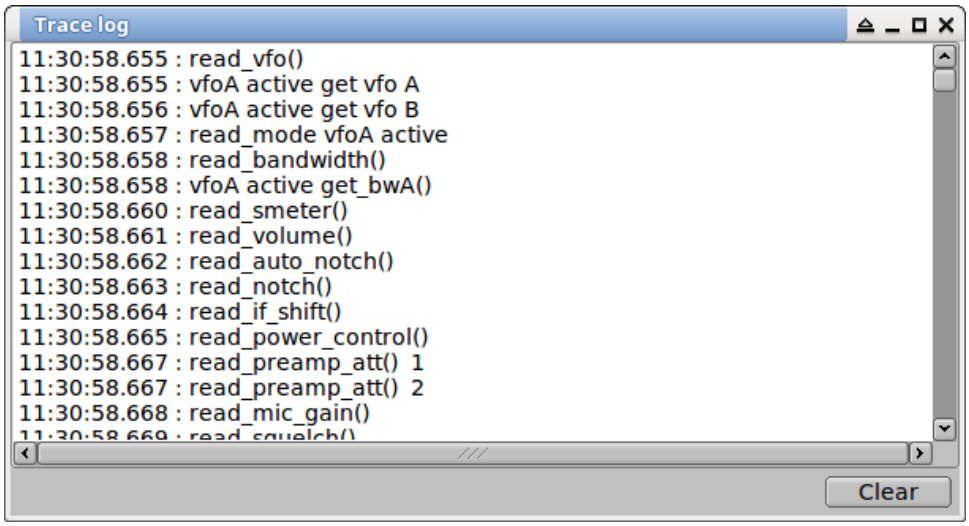


Figure 1.9 Example showing support code trace

flrig will read various transceiver parameters and restore them upon closing. The next image shows the available read/restore parameters for the Icom 7200. If a parameter is not available (or coded) it will be disabled and grayed out. Check each parameter that you want to read and restore. Reading and restoring transceiver parameters takes time, especially on older transceivers with low baud rate serial i/o. Check "Use xcvr data" i you want flrig to NOT change the transceiver operating state when it begins execution.

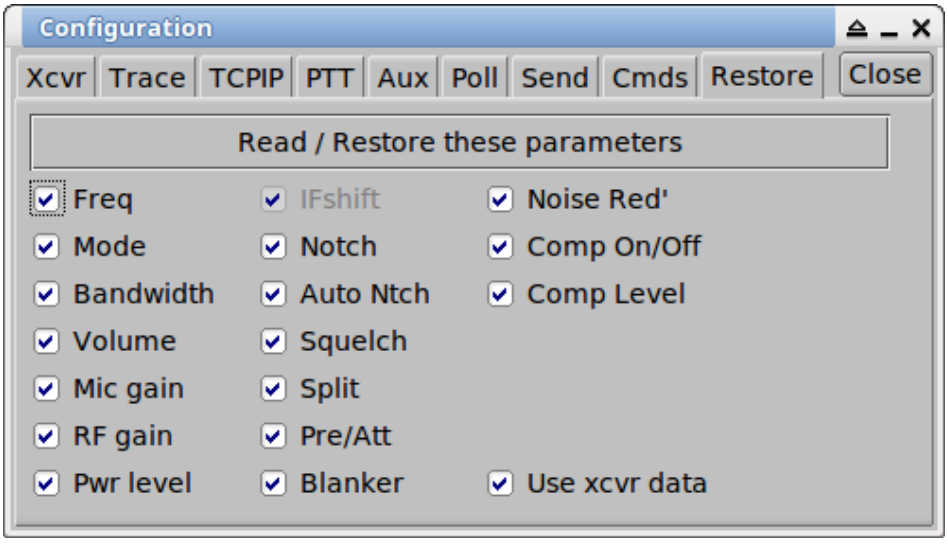
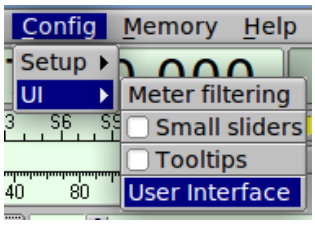


Figure 1.10 Restoring transceiver Status

1.3.2 User Interface



1.3.3 Meter Display and Filters

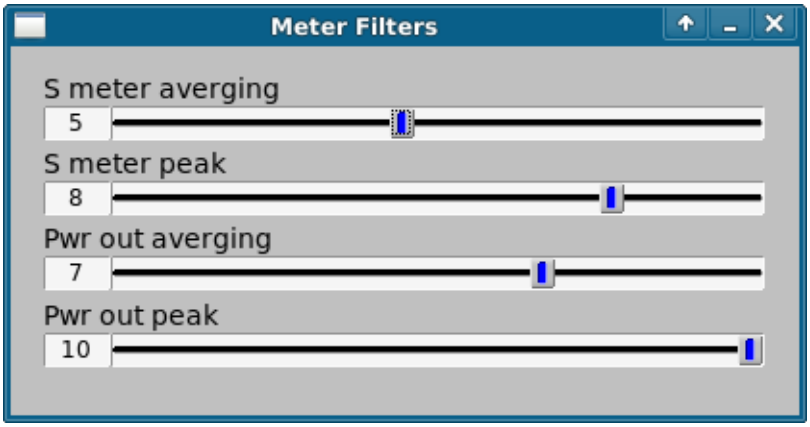


Figure 1.11 Meter Filter Controls

You can control the behavior of both the average and peak values of the S-meter and Power out meters. Setting the controls to 1 for both average and peak will simply display the latest value available from the transceiver. The average setting results in the display showing the average of the last N readings. The peak value will display the average peak value over the last M readings.

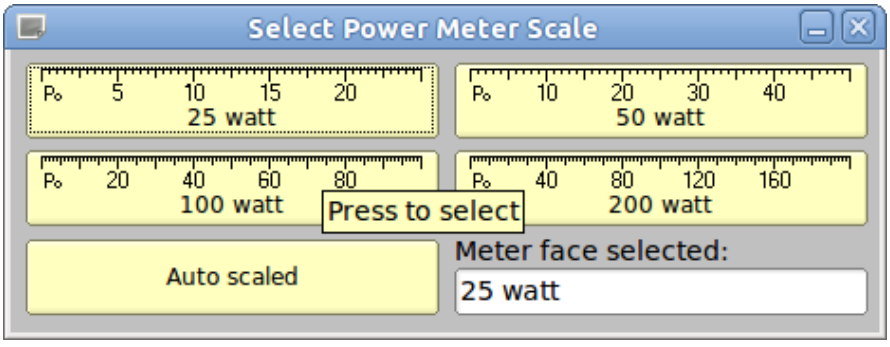


Figure 1.12 Meter Scale

Right click on the main dialog power meter scale to open up this selection dialog. Each of the 4 scales and the "Auto scaled" box are buttons. Press the one you want to use. Auto-scaling adjusts the meter scale to the smallest scale consistent with the current measured peak power. If that power is fluctuating near the transistion point between two scales you might want to fix the scale to either the larger or smaller.

1.3.4 Slider sizing

When the user interface is configured to be "small" then the UI submenu will contain the item "Small sliders". Toggling this menu item will immediately change the size and positions of the various slider controls. Select the toggle button "Small sliders" on the Config menu for 1/2 size sliders and a dialog layout that uses less vertical space.

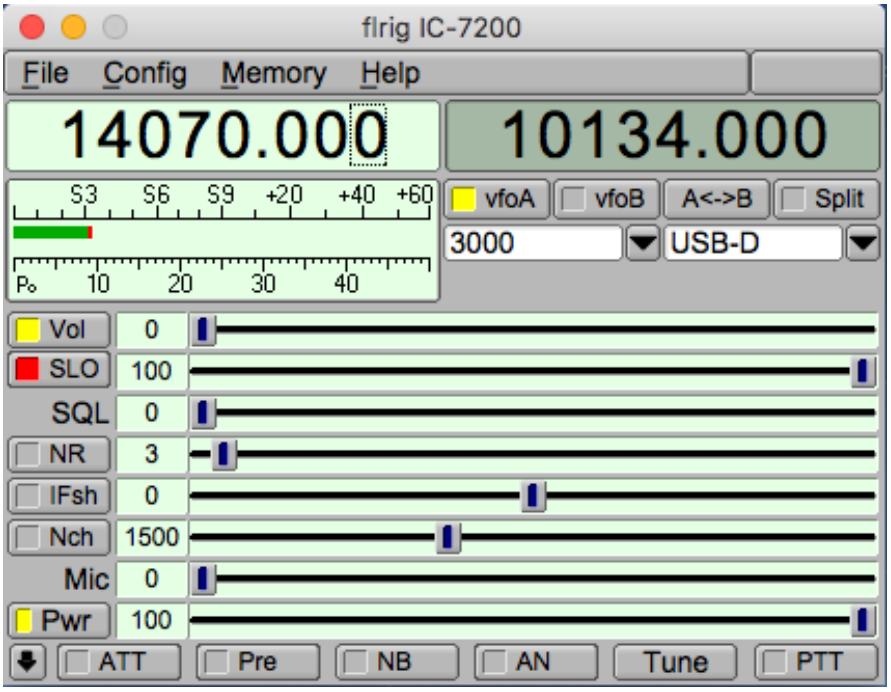


Figure 1.13 Small UI - Large Sliders

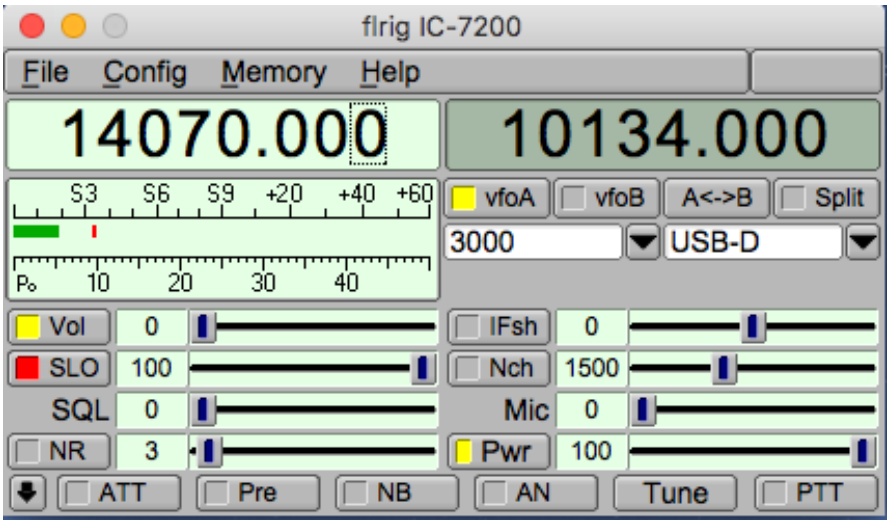
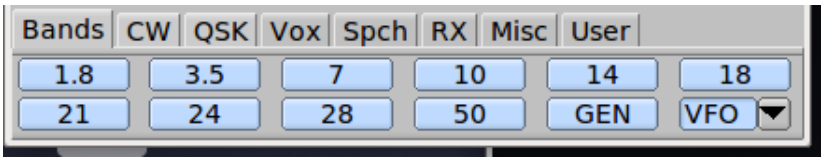
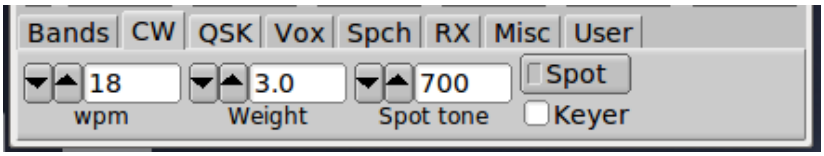


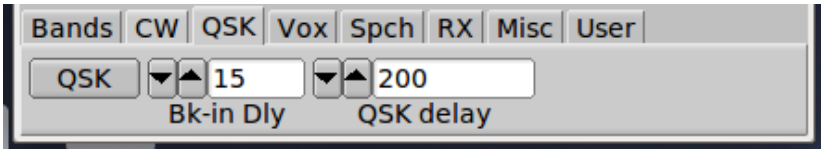
Figure 1.14 Small UI - Small Sliders

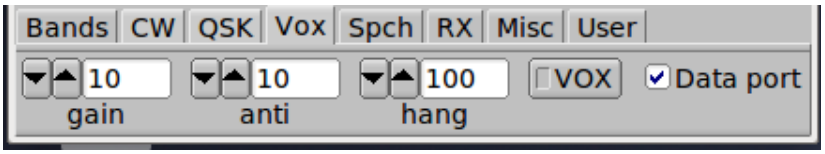
1.3.5 Additional Controls

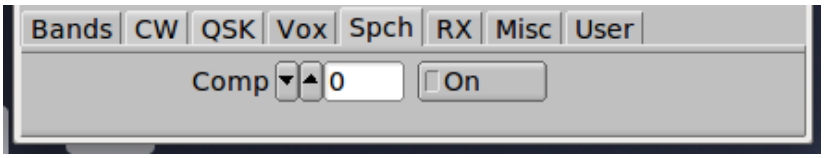
Additional control settings may be available depending on the transceiver being controlled. These are in a drop-down area toggled by the arrow button to the left of the attenuator button on the small aspect ratio dialog view. These are the controls for the Yeasu FT950.

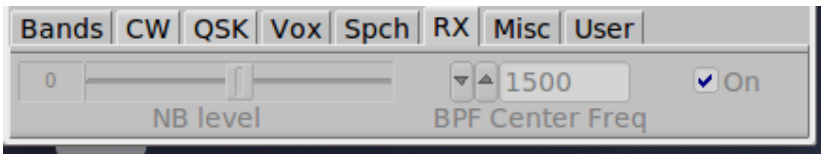


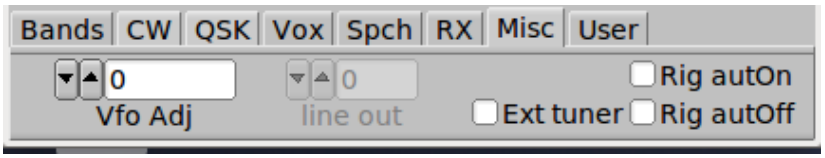


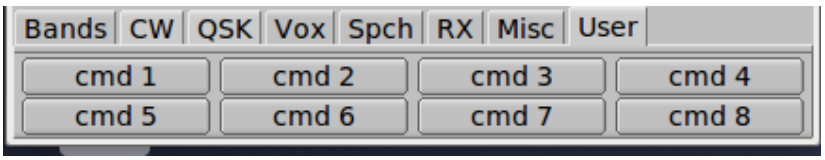




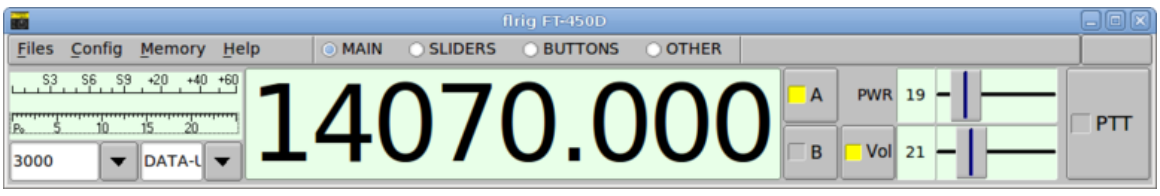




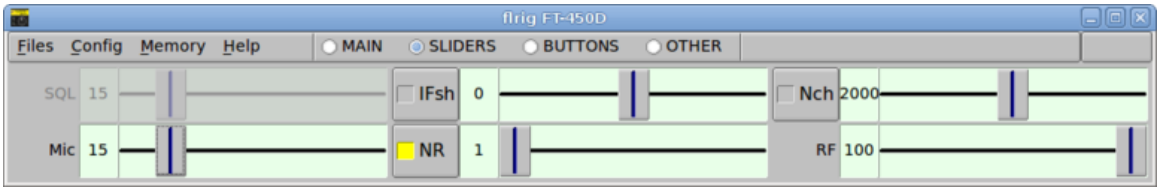


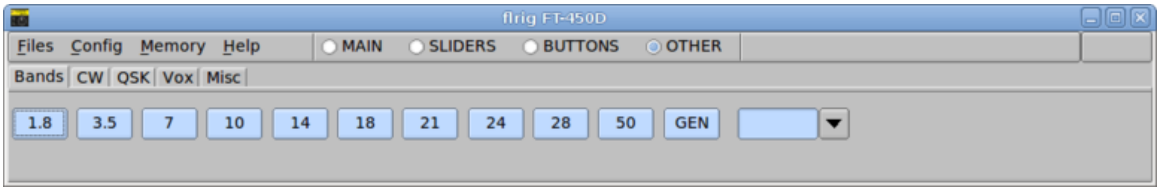


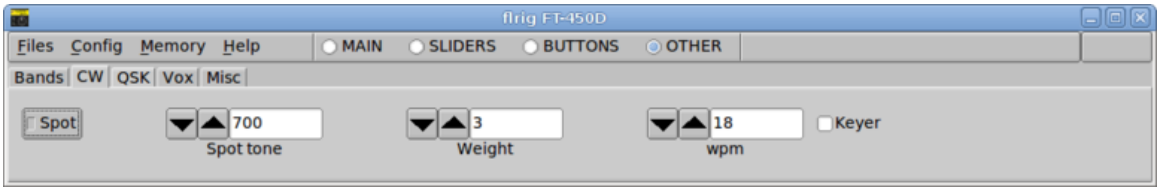
For the FT-450D, these control when accessed from the "touch" user interface scheme appear as:



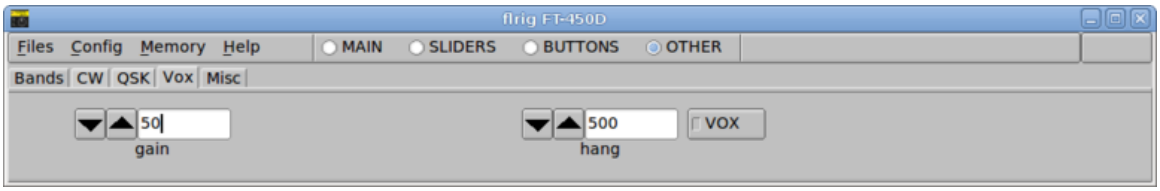

flrig FT-450D
Files Config Memory Help
MAIN SLIDERS BUTTONS OTHER
Att
Pre
NB
AN
A/B
Split
Tune


flrig FT-450D
Files Config Memory Help
MAIN SLIDERS BUTTONS OTHER
SQL 15
IFsh 0
Nch 2000
Mic 15
NR 1
RF 100


flrig FT-450D
Files Config Memory Help
MAIN SLIDERS BUTTONS OTHER
Bands CW QSK Vox Misc
1.8 3.5 7 10 14 18 21 24 28 50 GEN


flrig FT-450D
Files Config Memory Help
MAIN SLIDERS BUTTONS OTHER
Bands CW QSK Vox Misc
Spot
700
Spot tone
3
Weight
18
wpm
Keyer


flrig FT-450D
Files Config Memory Help
MAIN SLIDERS BUTTONS OTHER
Bands CW QSK Vox Misc
QSK
15
Bk-in Dly
200
QSK delay



Select the User Interface menu item to configure various user preferences including Configuring Fonts and Colors.

1.4 Operating Controls

Figure 1.15 Frequency Control

The frequency display is also a control. Each numeric is sensitive to the mouse left/right buttons for up/down and to the mouse scroll wheel for rapidly changing value. Click on upper half of the digit to increase frequency, and the lower half of the digit to decrease the frequency. Put the mouse over any of the numeric segments and you can enter a new frequency using the keyboard numeric keypad. If you make an error simply enter a non-numeric key. Set the newly entered frequency by pressing the Enter key.

To paste a frequency from the clipboard (kHz only), press control-V followed by the Enter key

Vfo-A and Vfo-B are separate controlS, A on the left, B on the right.

Left click on the A->B button to swap vfos. Right click on the A->B button to transfer vfoA to vfoB.

When the mouse pointer is over the frequency display you can also change frequency values using the arrow and page key buttons:

- left / right arrow - increase / decrease 1 Hz
- up / down arrow - increase / decrease 10 Hz
- Page Up / Page Down - increase / decrease 100 Hz

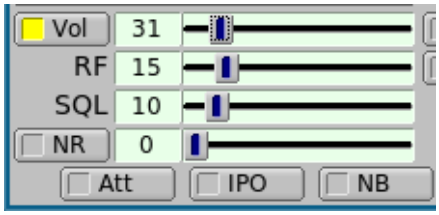


Figure 1.16 Control Sliders

The buttons that have a light box are toggles - activated when the lighted box is colored. Some of these are linked to a slider. If the button state is inactive then that associated slider will be greyed out. In the example the volume control is active and the NR control is inactive.

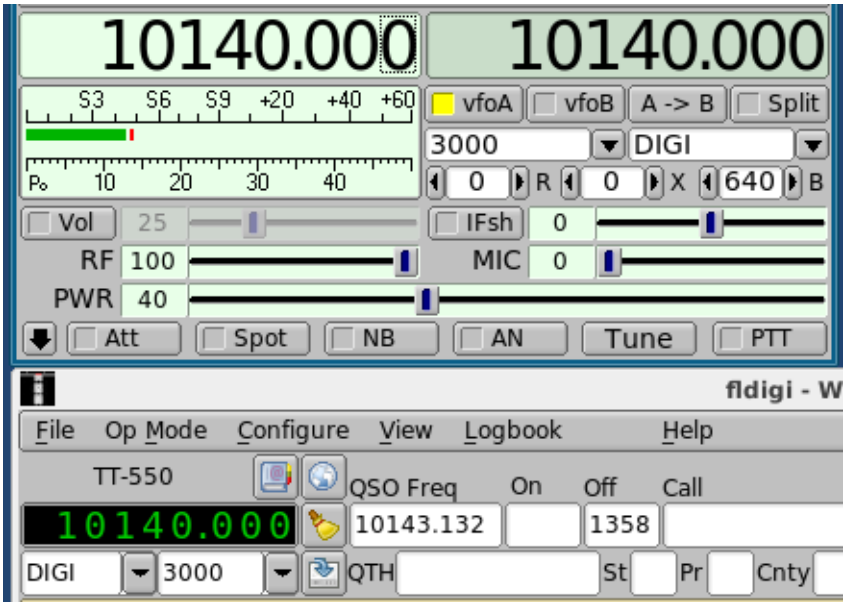


Figure 1.17 FLRIG/FLDIGI

Operating FLRIG with FLDIGI requires a simple setup in FLDIGI. Deselect all but the "xmlrpc" rig control. Xmlrpc is used via a local socket device for the two programs to communicate. FLDIGI acts as the server and FLRIG the client. There is no requirement for start / stop ordering of the programs.

FLRIG sends rig configuration data to FLDIGI when the two programs initially recognize each other. This data is used to populate the rig name, the available modes and the available bandwidths.

After this initial communications the operator can set the paired controls from either FLDIGI or FLRIG. The two programs will remain synchronized. The data from the computer to the transceiver is always from FLRIG.

PTT can be activated at FLRIG or using the T/R button on FLDIGI. FLDIGI also engages the PTT via the macro <TX> <RX> tags. When operating digital modes with FLDIGI you should use the PTT from FLDIGI.

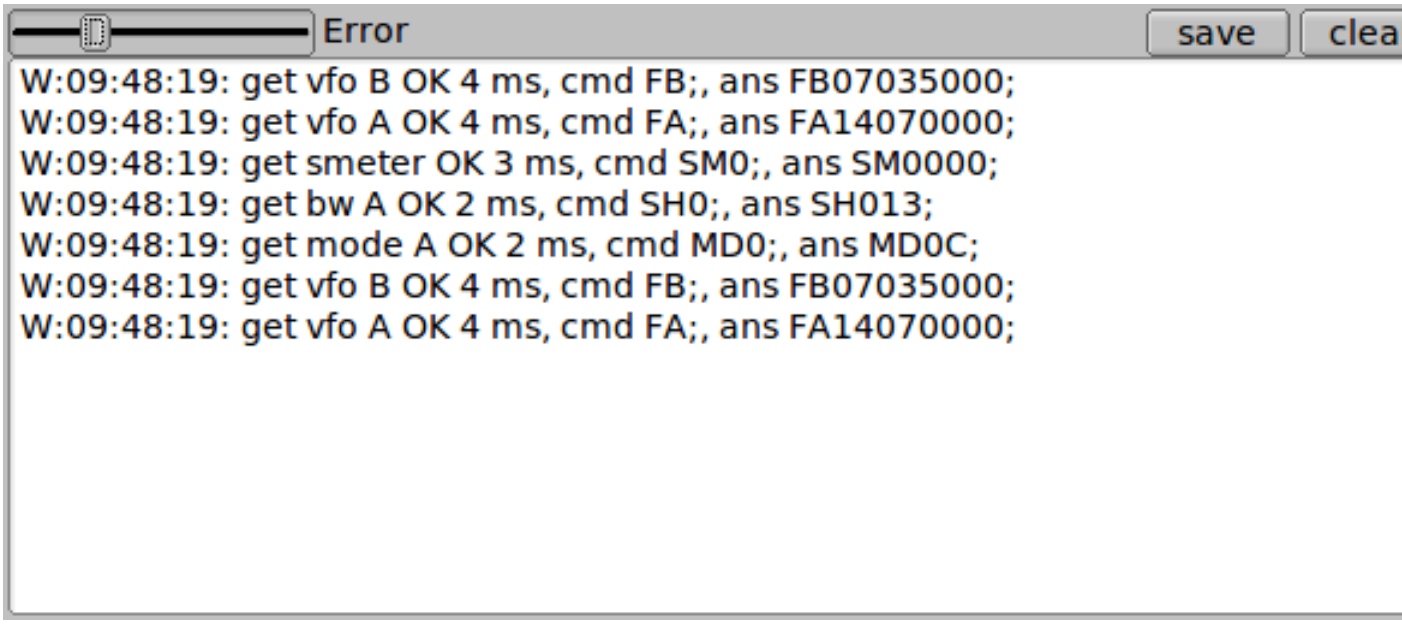


Figure 1.18 Event Log

The event log is opened from the "Debug" menu. It allows you to view the serial and xmlrpc data exchanges between FLRIG, FLDIGI, and the transceiver.

1.5 Controlling Multiple Transceivers

You can have multiple instances of flrig running, each controlling a separate and unique transceiver. Doing this requires a separate configuration folder for each target transceiver. Either start flrig from a command line or copy the desktop launch icon and then modify it's "target" executable. In either case you will be adding a command line parameter

"--config-dir <target-dir>"

Note the double dash. The <target-dir> will be unique to each supported transceiver, for example: "C:\↩ Users\<user-name>\flrig.ic7200" on Win-10, "/home/<user>/flrig.ic7200" on Linux or OS X. You will have to configure each instance with the correct interface parameters.

1.6 TT 550

The TenTec Pegasus, TT-550 is a computer only transceiver. FLRIG controls all aspects of this transceiver: TT550 - Pegasus Operating instructions

1.7 IC 7600

Andy's (VE3NVK / G8VTV) IC-7600 How-to

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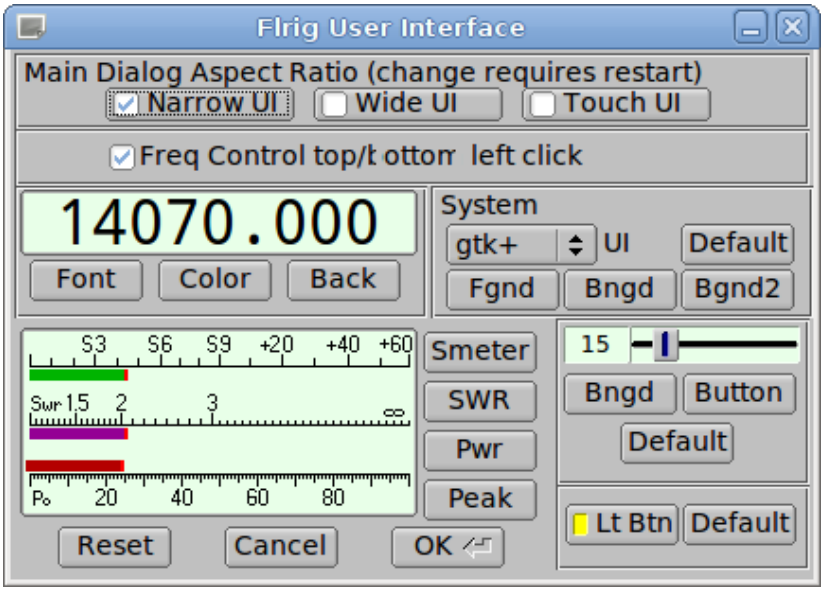
Chapter 2

Configuring Fonts and Colors



You can change many of the colors and fonts used in FLDIGI to suit your operating style. Those shown at the left are the defaults.

You can use the color dialog to set the colors, or if you understand the RGB color system you may directly edit the prefs file associated with the transceiver you are using. The prefs file is located in the FLRIG folder.

On linux and OS X this folder is

```
$HOME/.FLDIGI
```

On XP,

```
C:\Documents and Settings\<usr>\FLRIG.files
```

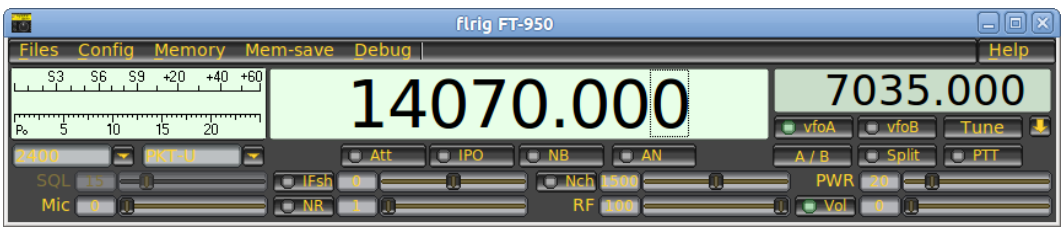
On Vista / Win7,

```
C:\Users\<usr>\FLRIG.files
```

The prefs file for the TT-550 Pegasus would be TT-550.prefs.

This bold look is achieved with the following settings found in the prefs file:

```
smeter_red:0
smeter_green:180
smeter_blue:0
peak_red:255
peak_green:0
peak_blue:0
fg_sys_red:255
fg_sys_green:210
fg_sys_blue:50
bg_sys_red:0
bg_sys_green:0
bg_sys_blue:0
bg2_sys_red:122
bg2_sys_green:141
bg2_sys_blue:147
slider_red:96
slider_green:100
slider_blue:115
slider_btn_red:209
slider_btn_green:177
slider_btn_blue:75
lighted_btn_red:72
lighted_btn_green:255
lighted_btn_blue:96
ui_scheme:gtk+
```



A similar color scheme but using the FLTK "Plastic" look for the controls.

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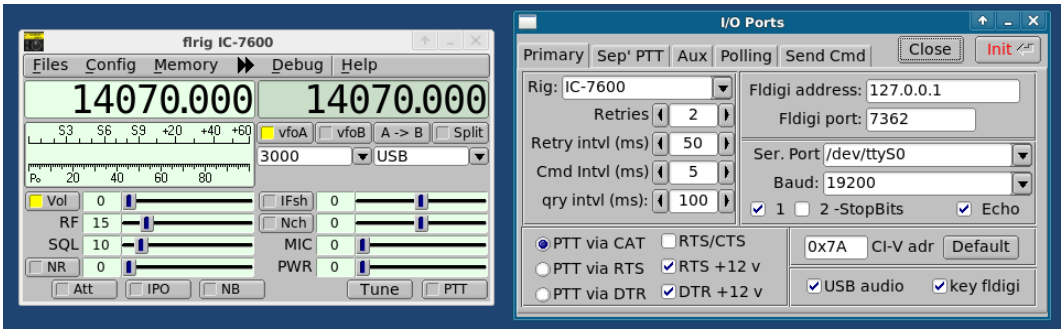
Chapter 3

IC-7600 How-to

Submitted by Andy - VE3NVK / G8VTV



How to use the USB audio connection of the IC-7600 to a computer with FLDIGI and FLRIG.

3.1 IC-7600 SETTINGS

Setting the IC7600 menu items

1. Go into setup on the 7600 (Exit/set) then goto "set" and finally "Levels"
2. Scroll to the item "Data 1 mod" and change the setting to USB (by turning the tuning dial).
   If you do not change this setting then the rig will not get the transmit audio - it still sends the received audio signal out though.
   You can use any of Data 1 to Data 3 settings if you have reason to but it is simplest to use the first.
3. Scroll up to the setting for "USB MOD Level" make sure it has some level set (mine is at 40%).
4. Scroll up to "USB Audio SQL" and make sure it is off(open) - We want the software to do any squelching on digital modes.
5. You will probably also want to leave the setting for DATA OFF MOD at the default of "Mic,Acc", if you still intend to use a microphone for SSB!
   You can just turn it to Mic alone to avoid any confusing complications.
   If you have another audio interface plugged into the auxiliary port, such as a TNC you will probably want to leave it alone.

That should be it for the radio settings.

3.2 SOFTWARE SETTINGS

Now, on the computer, make sure that the sound card on the output side has some initial level set; try from 20 to 60% for starters.

If using FLRIG, (the companion software) to FLDIGI, both of which I strongly recommend, set a level for microphone and power level (start at say 50%). I find that I ended up with the mic level very low at about 5%. If you are not using FLRIG in association with FLDIGI then you do have some other interface options, explained in the main FLDIGI on-line help.

Start both FLDIGI and FLRIG, make sure that FLDIGI is set to use XML-RPC for rig control, and not anything else. If you try to use rig control from both FLDIGI with FLRIG running then there will be conflicts, and who knows which programme will be in charge. FLDIGI sends frequency, mode and bandwidth changes to the transceiver via FLRIG when XML-RPC is selected. FLRIG in turn annunciates changes back to FLDIGI. The radio, FLRIG and FLDIGI should stay in synch no matter where the change occurs.

3.2.1 FLDIGI

1. On FLDIGI's "Configure" tab and rig control tab make sure that you only select XML-RPC.
2. On the "Audio" tab make sure (on Linux) that you have selected the correct audio device. I use PortAudio so I have selected both Capture and Playback show up as "USB Audio CODEC: USB Audio ..." (after that is will show the hardware port as something like (HW:0,0) - this last part will change depending on how your computer is set up to identify the audio ports.
3. In the OS sound mixer application, the 7600 USB audio will probably be identified as "PCM2901 Audio Codec."
4. If you are using Pulse audio the mixer function is performed in the Pulse-audio mixer application. Pulse audio will remember both the record and playback levels required for each application that it serves.

3.2.2 FLRIG

1. Open the Config/Transceiver select tab and perform the following in the dialog window that opens
2. Make sure to select the rig ic-7600 that the serial port is selected - it will be something like (again in Linux) /dev/ttyUSB0, the number at the end may be different, and if you have more than one USB serial device connected, make sure you have the correct one. (Hint: use the command, in a terminal screen, 'lsmod')
3. Make sure the CI-V address is correct, the default for the 7600 is 0x7A
4. Check off the "USB Audio" box.
5. Select the button for PTT via CAT.
6. Ensure that the baud rate is compatible with what you have set on the 7600 I use 19200.
7. Select 1 stop bit
8. Enable the checkbox for Echo.
9. Now for retries, retry interval, cmd interval and query interval, I use 2, 50, 5, 100, but other values will certainly work for you. If you want faster response to the frequency when changed using the tune dial on the rig you may want to try reducing the value of QRY interval.

Make sure to press the INIT button before closing the window so that the settings you have changed TAKE.

When using digital modes make sure that (even for CW) that you have selected "USB-D1" for the audio connection. If you use anything else, you will NOT be able to transmit, just receive. (Unless you decided to set up for USB-D2 or D3). This shows in both FLRIG and FLDIGI.

The rig should then also show that it is set to USB-D1 with a blue background just above the frequency display and between the VFO and filter setting indicators.

If, as has happened to me with some of the iterations of FLRIG, the 7600 stops showing USB-D1, change it back by either pressing the USB button repeatedly on the 7600 until it shows, or in FLRIG if you can.

3.2.3 SETTING LEVELS AND TUNING

Finally using the TUNE button on FLDIGI, set up the power and modulation levels for almost no ALC action. You will have to play with both the MIC setting in FLRIG, and the output level setting for your sound mixer to get this right. You can work digital modes such as PSK31 very well with power levels of less than 25 watts output. Doing so does not stress your output finals too much and still gives you an effective signal out (unless your antenna system is awful.) At 25 watts output my rig shows about 13 amps for Ip.

When making these level selections make sure you press in and hold the rig's meter button for 1+ sec so that all the readings show at the same time.

Please note that the TUNE button on FLRIG does not work the same as the same as the tune button in FLDIGI. The tune button on FLRIG tells the 7600 to use its internal tuner to match to the antenna at the frequency selected. If you are already tuned then if will go on and off again very quickly with no time to adjust modulation level settings. The TUNE button on FLDIGI sends a continuous two tone signal at the maximum level, and is intended for setting the modulation levels - that is the one to use.

As I only use Linux on my rigs computer I have not been able to provide instructions for Windows users but they are essentially the same except as to how the serial port and audio ports are identified.

CAUTION

Last of all, always turn the 7600 on before starting FLRIG and FLDIGI, and always close the two programmes before turning off the 7600. If you do not do it in this fashion you may have to reset settings on starting up the programmes, and they will almost always hang on shutting down - at times necessitating a reboot in Windows.

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Chapter 4

TT550 - Pegasus Operating instructions

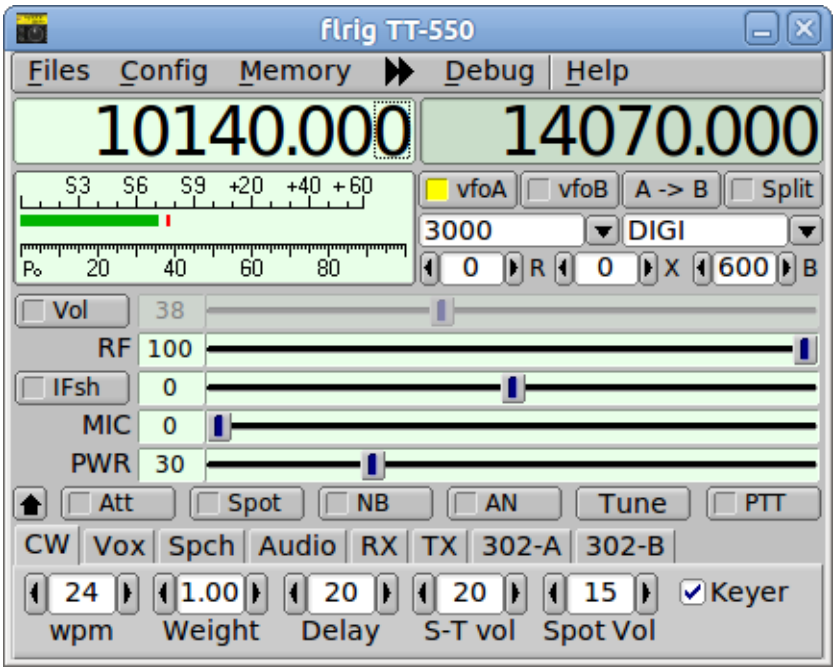


Figure 4.1 FLRIG - TT550

FLRIG provides a full implementation of all TT550 control functions including the operation of the Model 302 remote keypad. The TT550 selection can also be used with the TT538, Jupiter. The Jupiter emulates all of the Pegasus commands.

All of the FLRIG "front panel" controls operate the same as for any other transceiver with a few exceptions. The Pegasus does not have any preamp control. So that button is converted for use as a spot control when the rig is in CW mode.

Select CW mode and then press the spot button. You should hear the sidetone (if not you may need to increase the Spot Vol ... see below). You can then adjust the B (BFO) control for the desired sidetone frequency.

The DIGI mode is unique to FLRIG and the TT550. The control commands available on the Pegasus allow the program to control the center frequency and the bandwidth for all of the DSP filters. The DIGI mode is designed to

always place the center frequency of the filter at 1500 Hz. When FLRIG is used with FLDIGI this provides a very convenient and easy way to QSY to a received signal and then narrow down the filter. The Pegasus DSP filters are very well suited to digital mode operations.

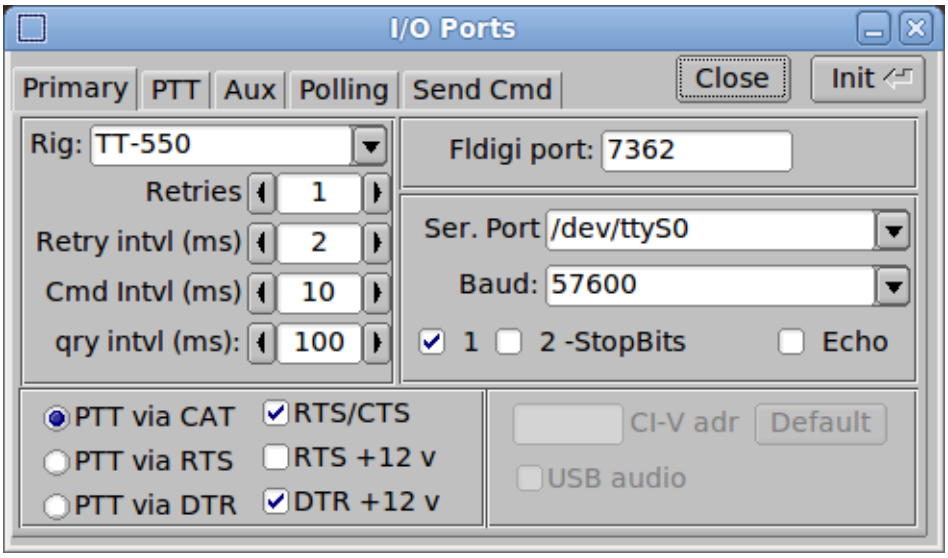


Figure 4.2 I/O Ports - Primary

Selecting the TT550 from the rig selection combo box should preset all of the interface controls. You should only need to select from the serial port combo. FLRIG will find all unused serial ports so be sure that the TT550 is not being accessed by another software when you start FLRIG.

It is necessary to press the Init button when you first set the program for use with a transceiver. Subsequent use should not require any action on the part of the operator.

The TT550 has it's own set up dialog for accessing those controls that are not routinely used. This dialog is opened by the "Config / Xcvr setup" menu.

4.1 Additional Control

Access to the additional controls is obtained by the down arrow button to the left of the Att control.

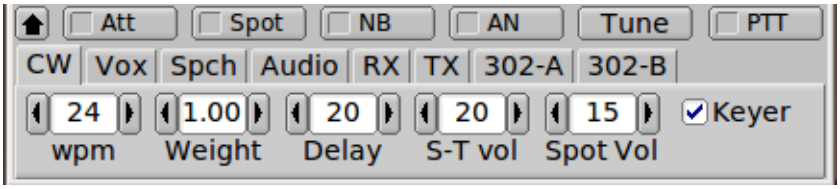


Figure 4.3 TT550 - CW

4.1.1 CW

The internal keyer can be enabled and both the words/min and the weight of the keyer can be adjusted. The Pegasus is a QSK rig and you can adjust the QSK hold in milliseconds. You can adjust the keyer sidetone volume relative to the received audio. Set the control to zero if you do want to hear the sidetone. The Spot Vol control is associated with the Spot button on the front panel. This volume is also relative to the receiver volume control.

4.1.2 VOX

Figure 4.4 TT550 - VOX

You can operate the Pegasus with manual SSB PTT or with Vox. The three Vox controls are controlled IAW the 550 manual.

4.1.3 Speech

Figure 4.5 TT550 - Speech

You can monitor the SSB speech level (recommended only with headphones). The compression level is also adjustable and speech compression can be enabled or disabled as suited.

The Accessory socket line out level can be set to prevent overdriving of a terminal node controller or computer sound card interface. The front panel NB, noise blanker, control can be set for any level from NONE to

1. AGC can be set for slow, medium or fast. The transmitter can be disabled. Very useful if you do not want idle hands pressing the PTT switch. The Tloop (for amplifier) can be enabled and finally if your Pegasus has the built-in tuner it can be bypassed.

4.1.4 Audio

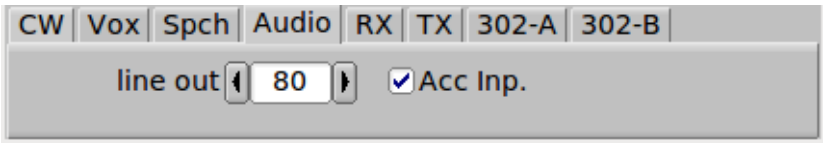


Figure 4.6 TT550 - Audio

Audio can be either from the Mic connector or from the Accessory input (digital mode ops). The level of the line out on the remote connector can be controlled independent of the speaker.

4.1.5 RX

Figure 4.7 TT550 - Receive

The signal frequencies internal to the Pegasus are all derived from a single oscillator. That oscillator can be corrected for frequency error using the VFO adjustment control.

4.1.6 TX

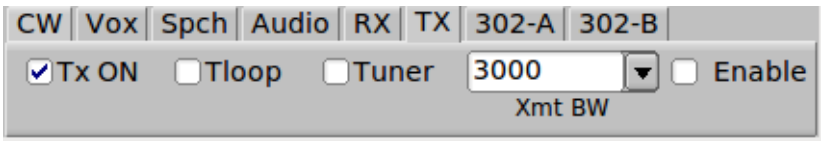


Figure 4.8 TT550 - Transmit

The signal frequencies internal to the Pegasus are all derived from a single oscillator. That oscillator can be corrected for frequency error using the VFO adjustment control.

4.1.7 302A

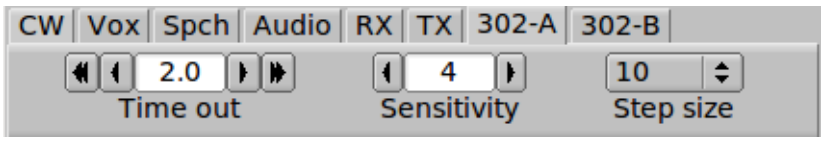
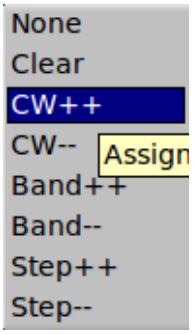


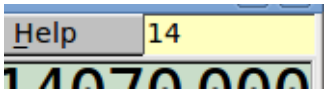
Figure 4.9 TT550 - 302A

302 Keypad Accessory If you have the 302 keypad you can set various parameters to adjust it's performance. The function keys can be assigned on of several response functions:



Both the Pegasus and the Jupiter can be controlled with the Model 302 key pad / encoder.

As you enter keypad values from the keypad they will appear in an entry box at the upper right of the main dialog. These are used for entering a frequency in kHz (i.e. 14.070 MHz is entered as 14070.000).



Here the numbers 1 and 4 have been pressed in sequence. You can abort the input by pressing the decimal value twice in succession. You can also set a time out in seconds. Failure to continue an entry within the time out period will also abort the input.

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Chapter 5

Supported Elecraft Transceivers

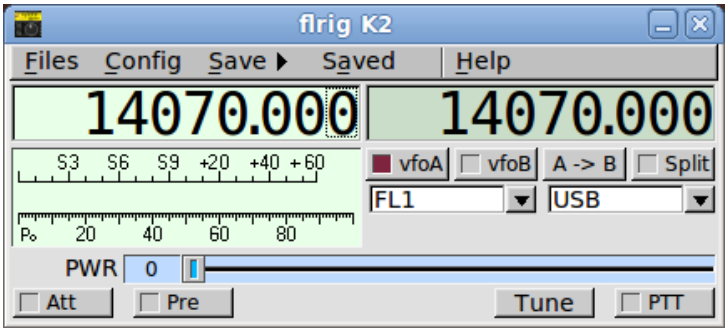

Figure 5.1 K2

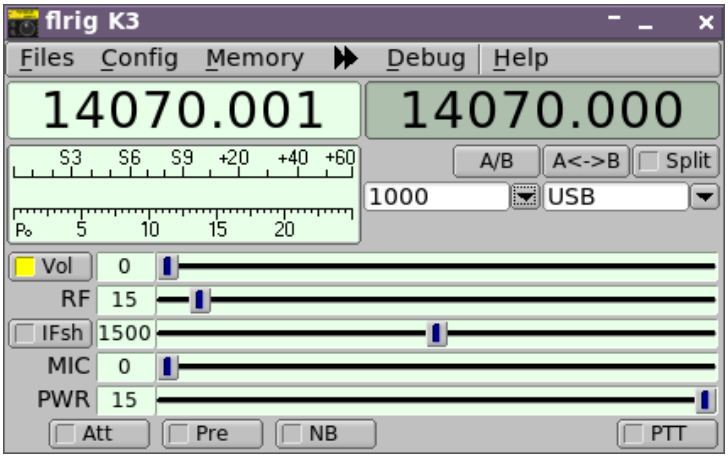

Figure 5.2 K3/KX3

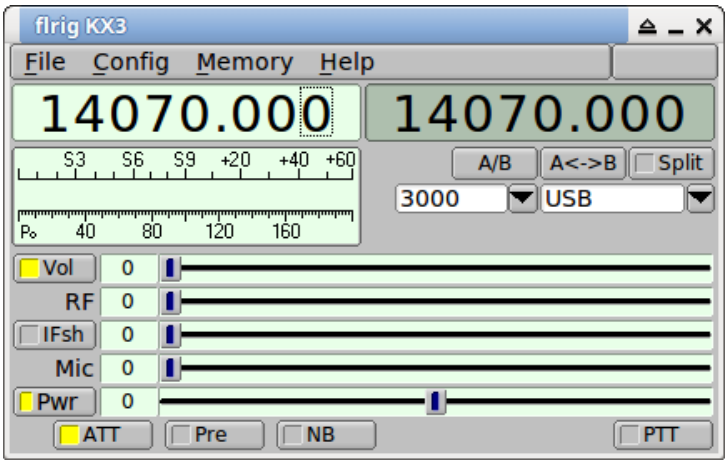

Figure 5.3 K3/KX3

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Chapter 6

Supported Icom Transceivers

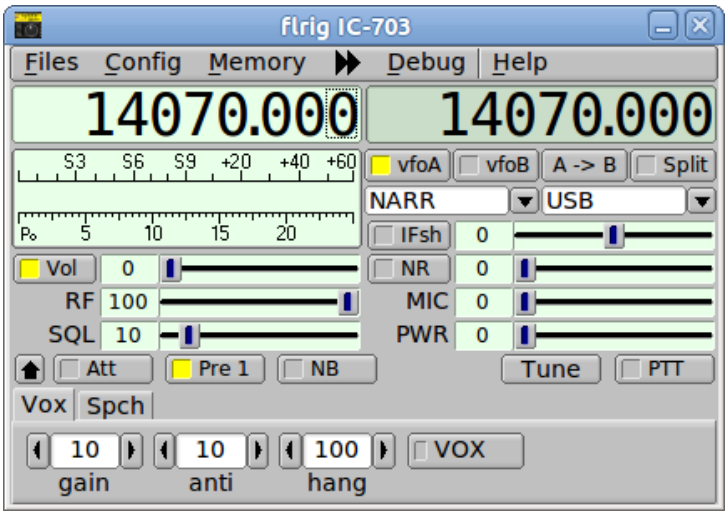


Figure 6.1 IC 703

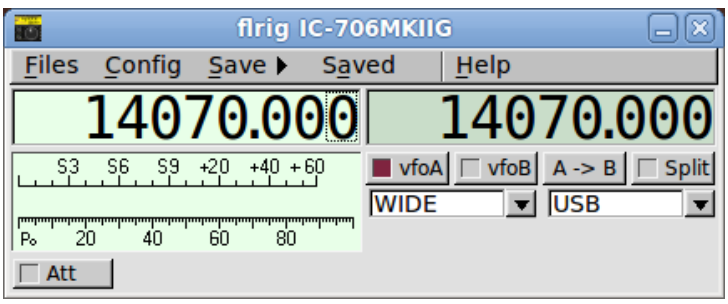


Figure 6.2 IC 706 MKIIG

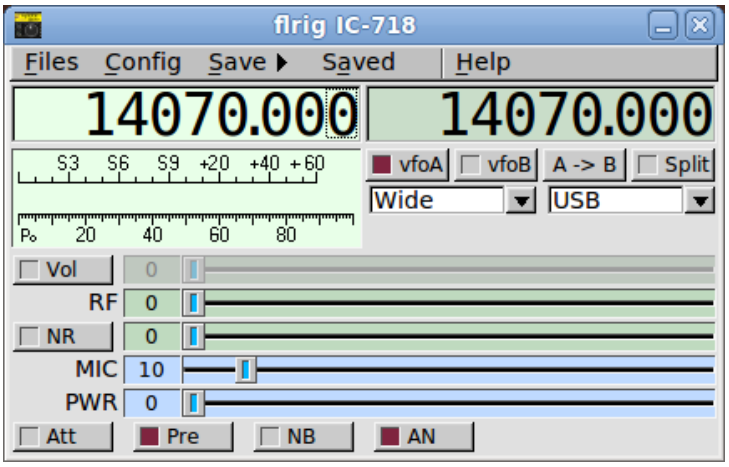


Figure 6.3 IC 718

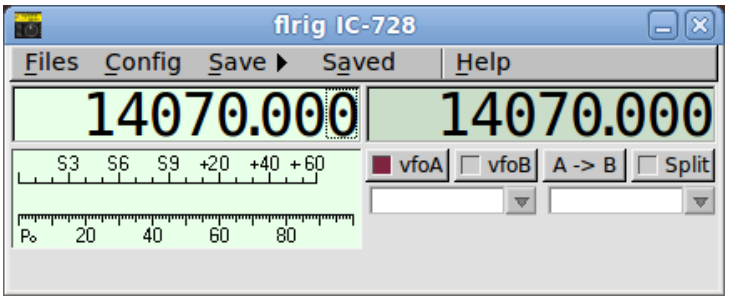


Figure 6.4 IC 728

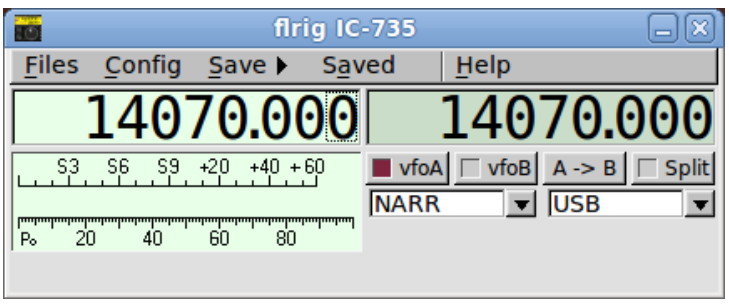


Figure 6.5 IC 735

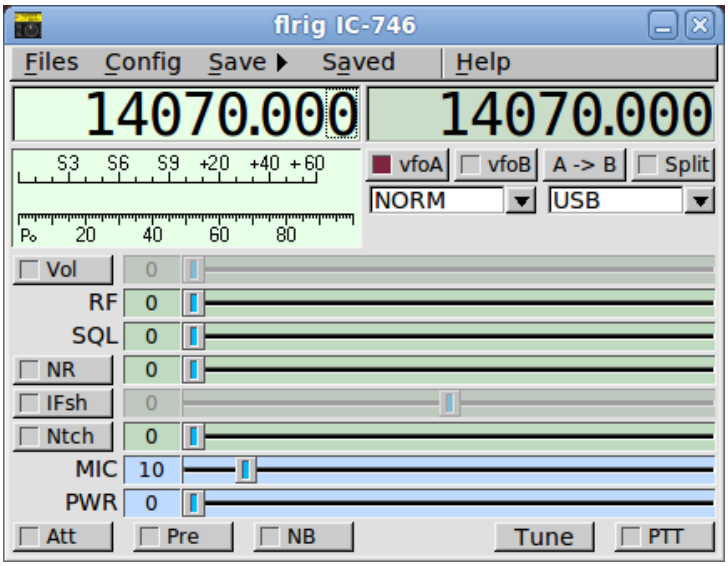


Figure 6.6 IC 746

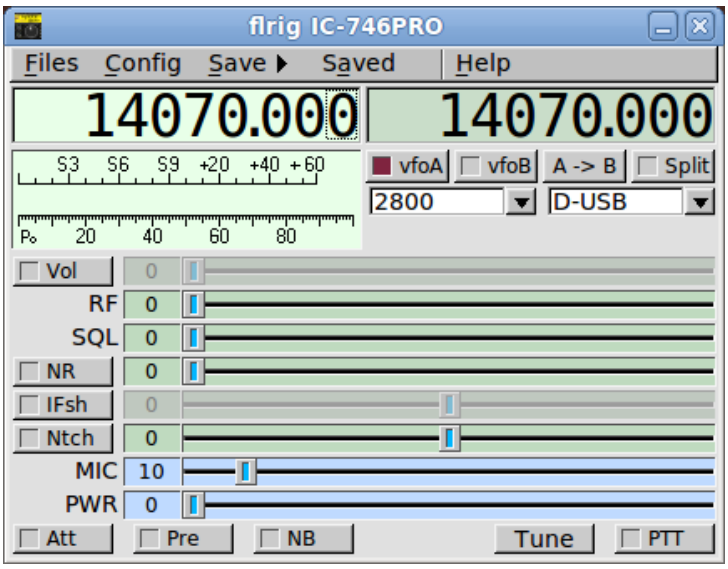


Figure 6.7 IC 746

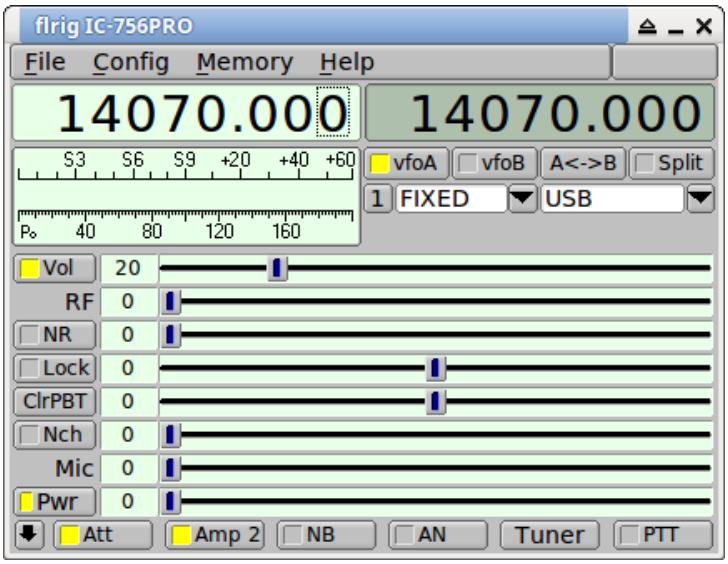


Figure 6.8 IC 756 pro2

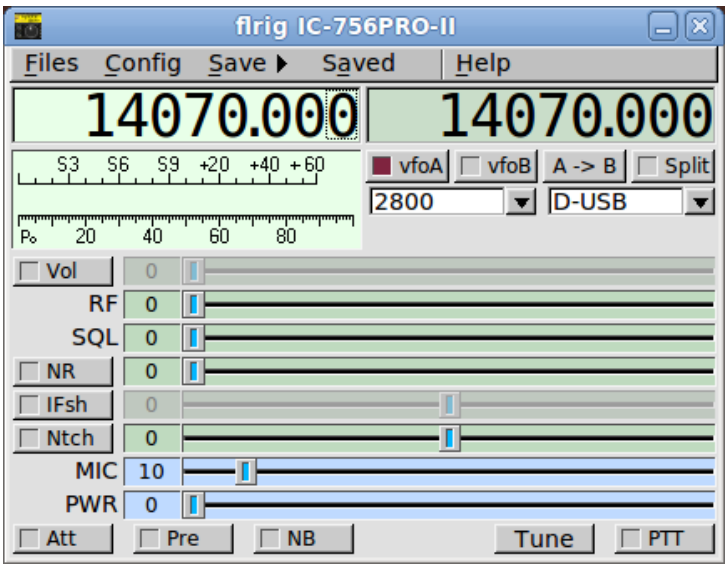


Figure 6.9 IC 756 pro2

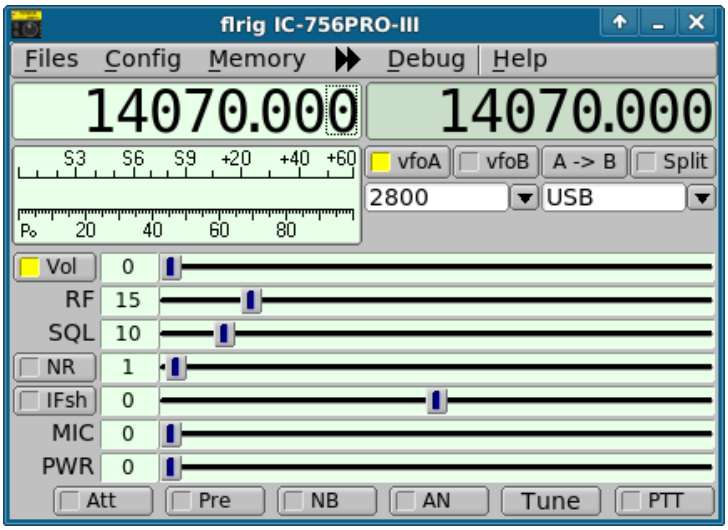


Figure 6.10 IC 756 pro3

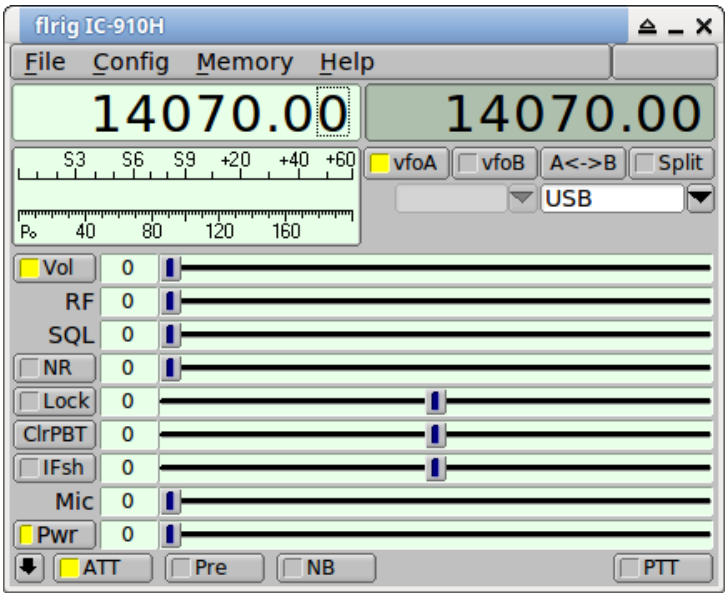


Figure 6.11 IC 910 H

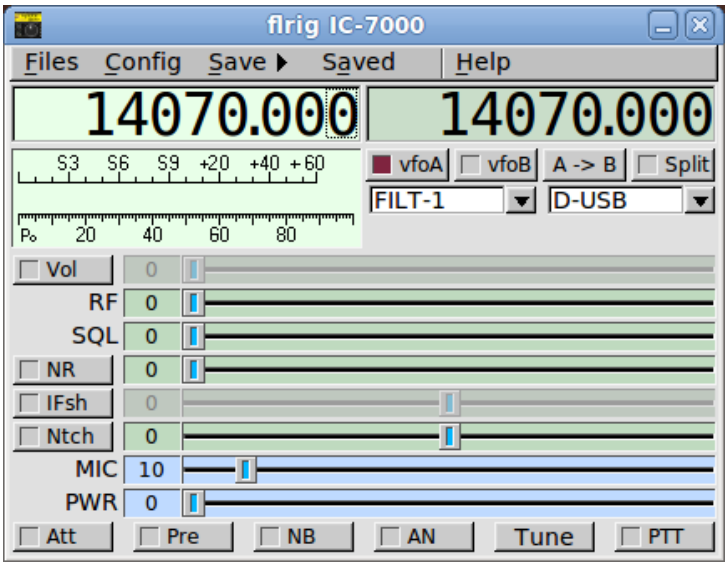


Figure 6.12 IC 7000

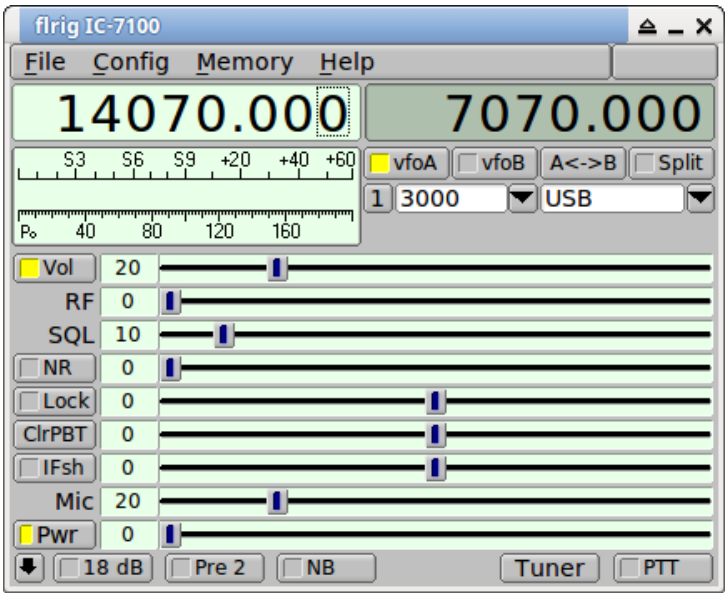
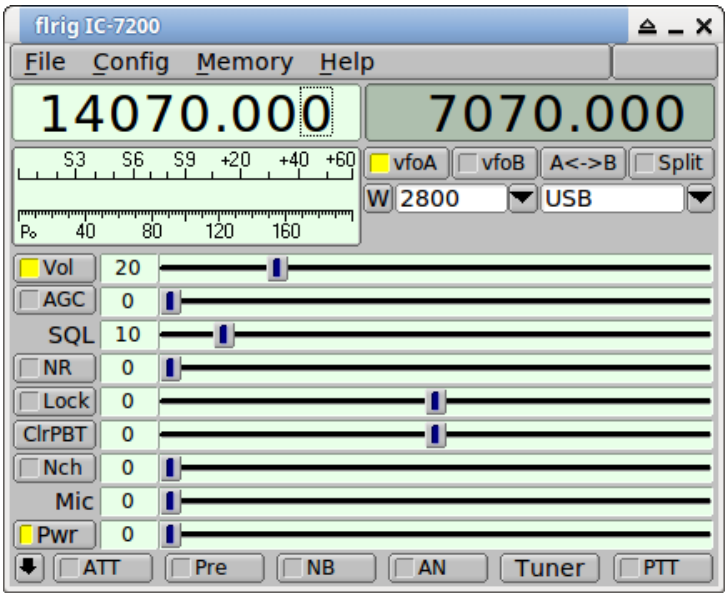


Figure 6.13 IC 7100



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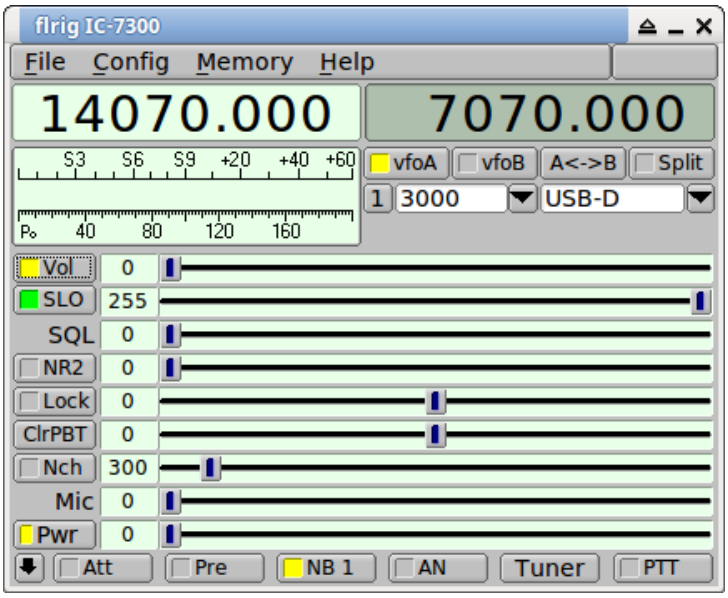

Figure 6.15 IC 7300

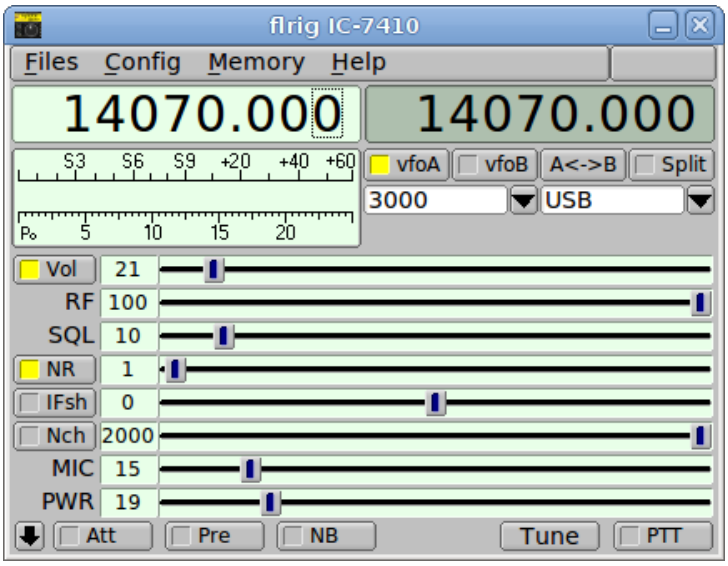

Figure 6.16 IC 7410

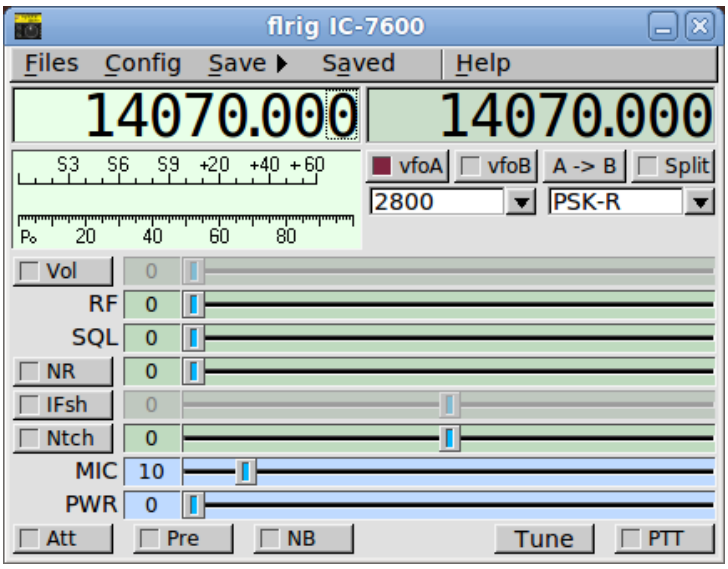

Figure 6.17 IC 7600

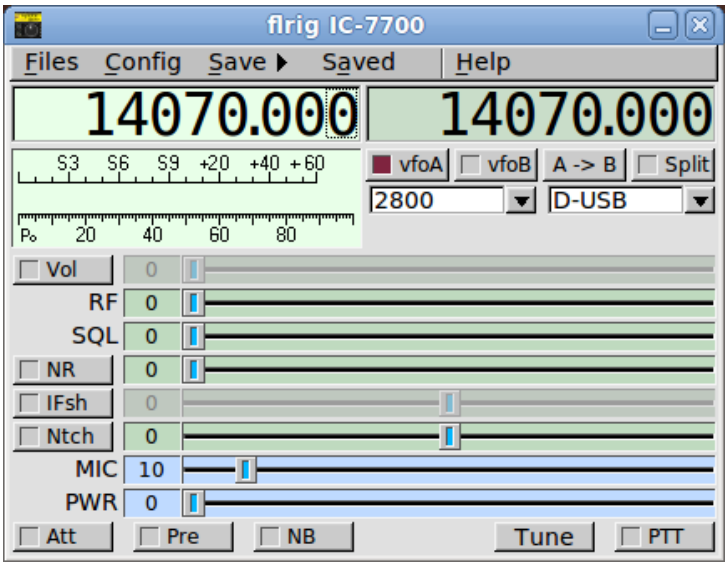

Figure 6.18 IC 7700

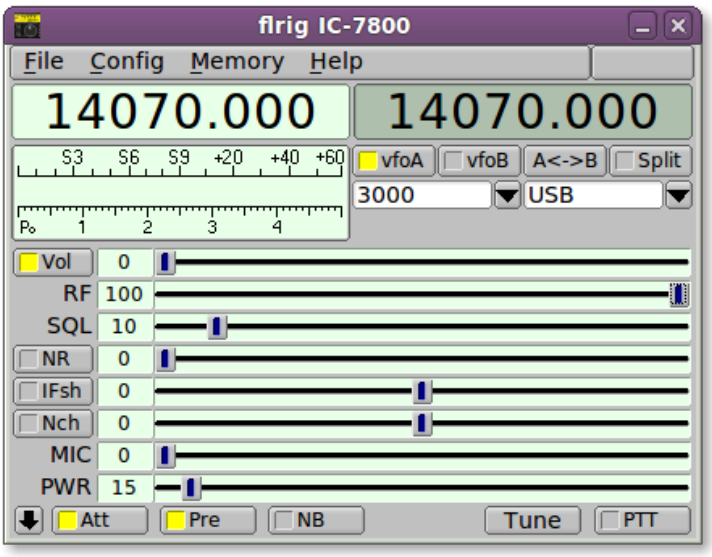

Figure 6.19 IC 7800

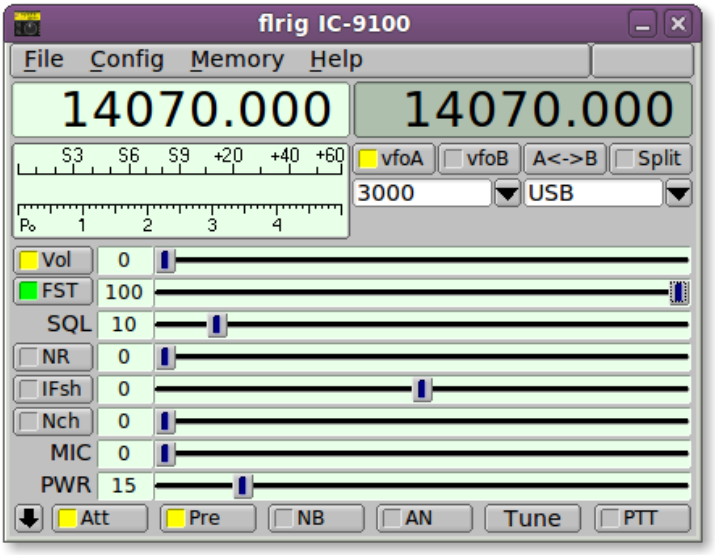

Figure 6.20 IC 9100

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Chapter 7

Supported Kenwood Transceivers

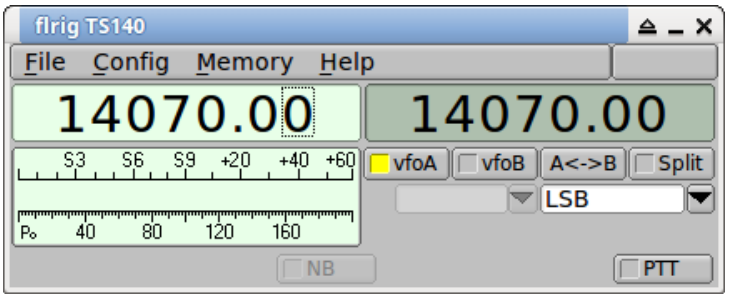

Figure 7.1 TS 140

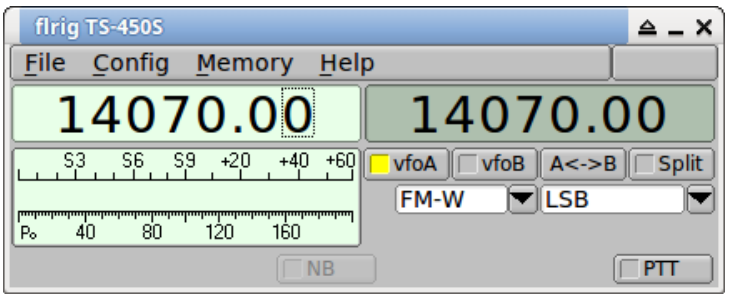

Figure 7.2 TS 450S

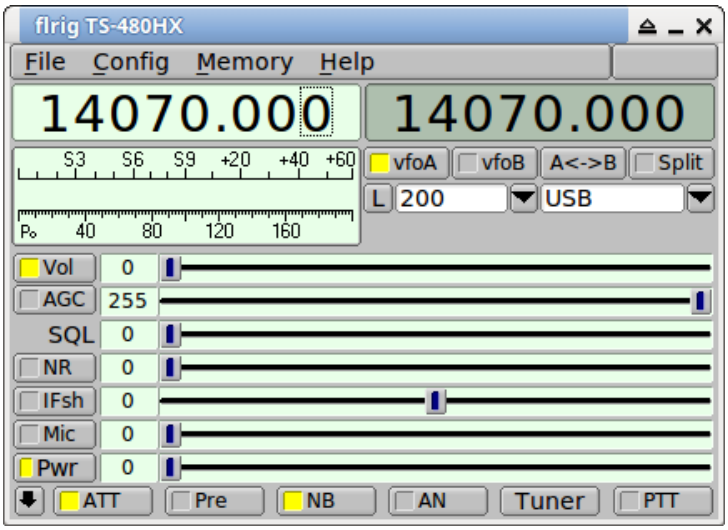

Figure 7.3 TS 480HX

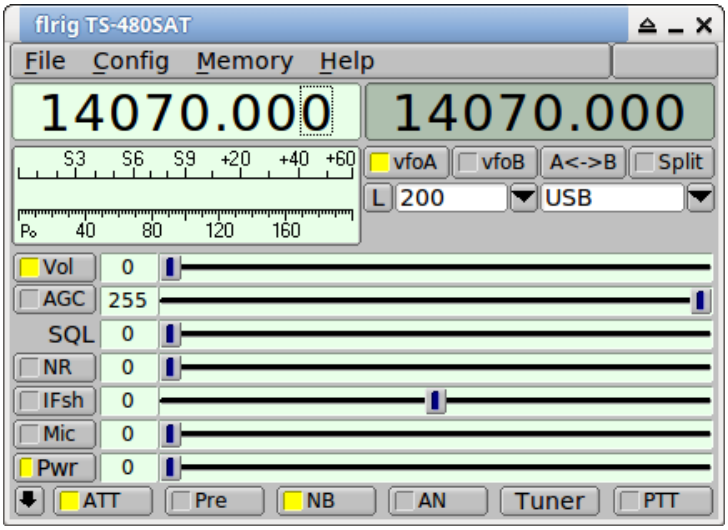

Figure 7.4 TS 480SAT

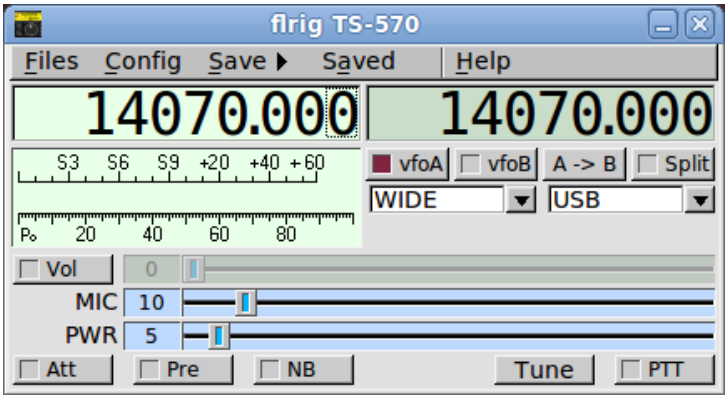

Figure 7.5 TS 570

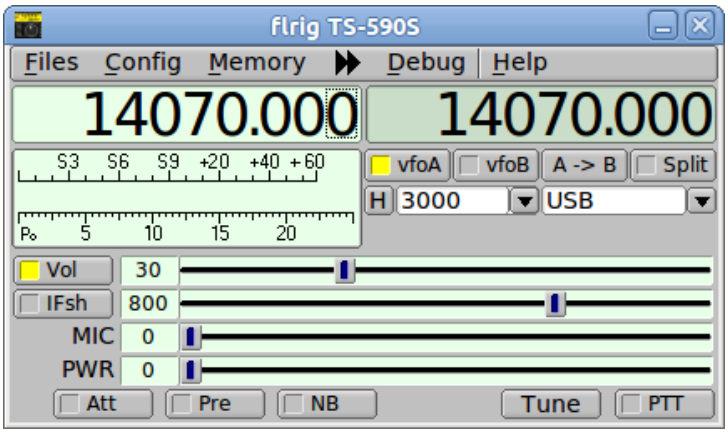

Figure 7.6 TS 590S

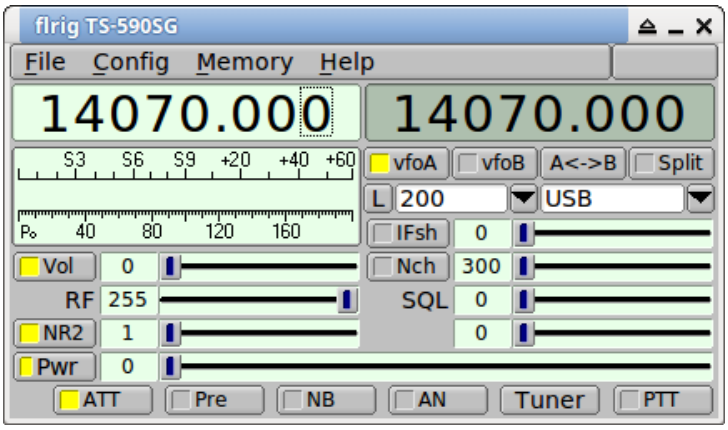

Figure 7.7 TS 590SG

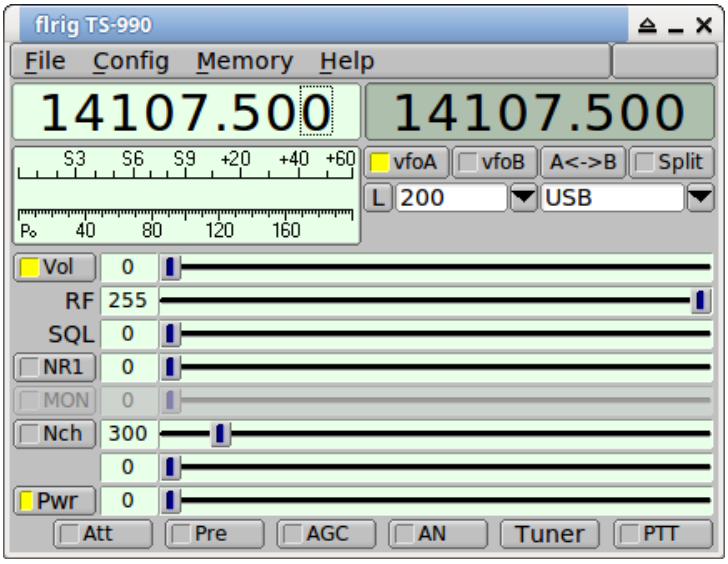

Figure 7.8 TS 990

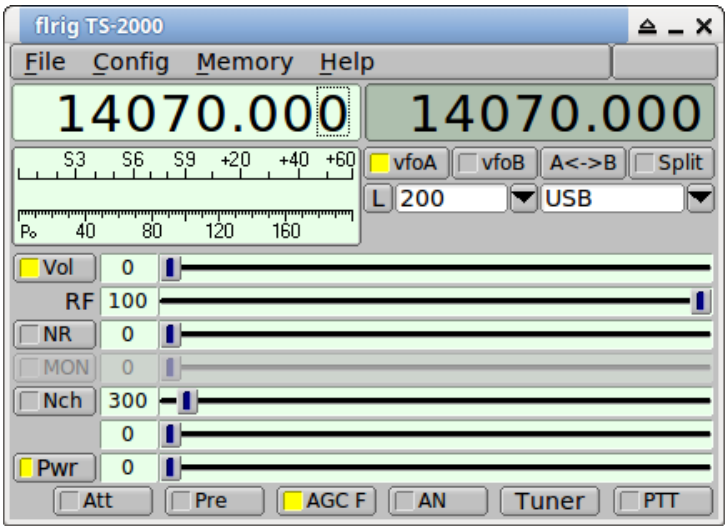

Figure 7.9 TS 2000

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Chapter 8

Supported TenTec Transceivers

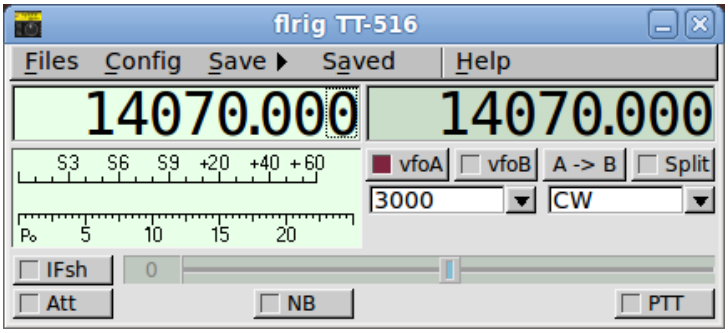

Figure 8.1 TT 516

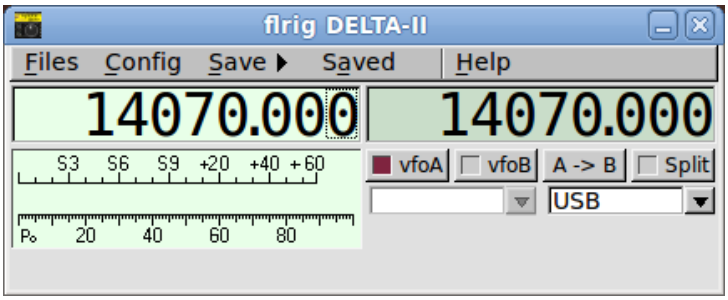

Figure 8.2 TT 535

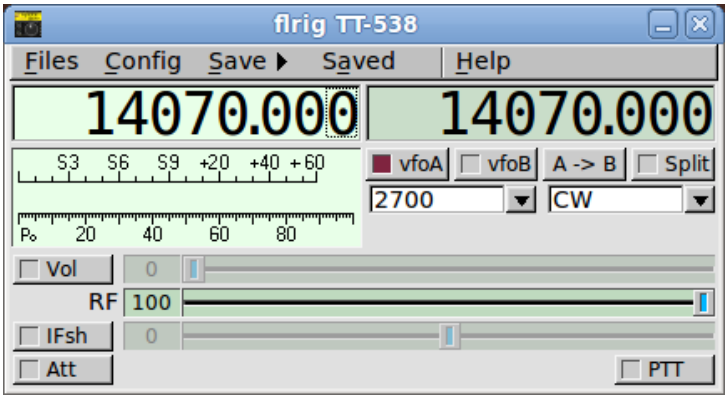

Figure 8.3 TT 538

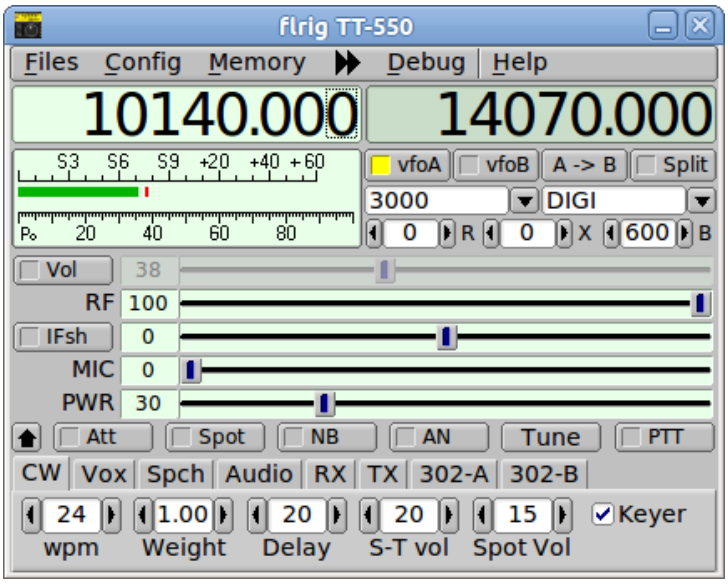

Figure 8.4 TT 550

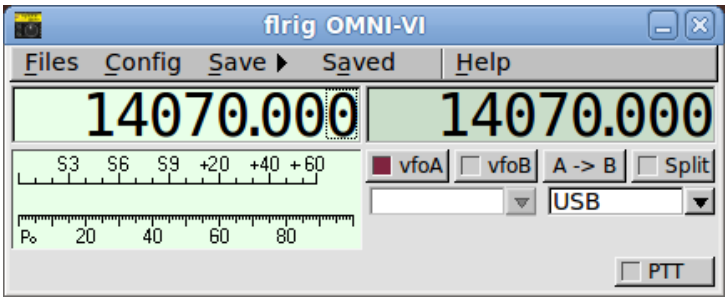

Figure 8.5 Omni VI

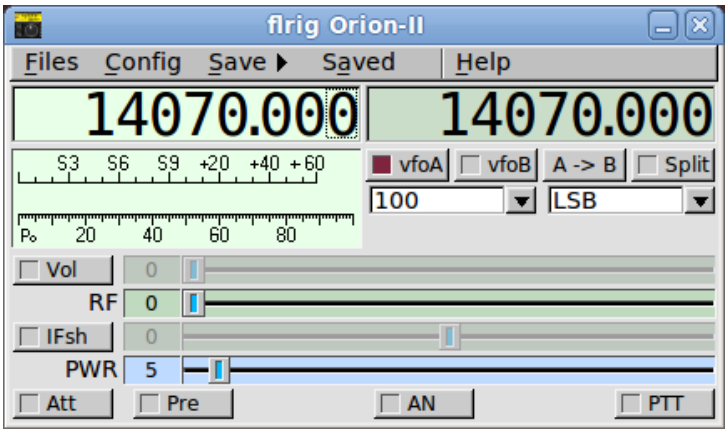

Figure 8.6 TT 566

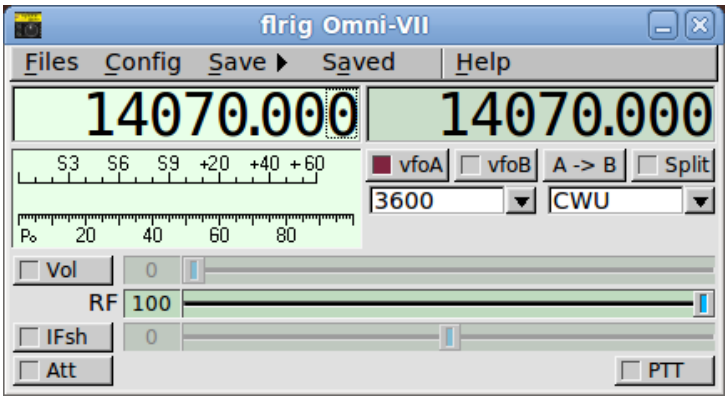

Figure 8.7 Omni VII

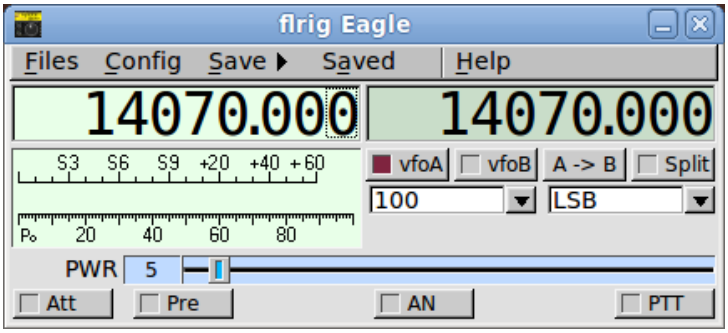

Figure 8.8 TT 599

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Chapter 9

Supported Yaesu Transceivers

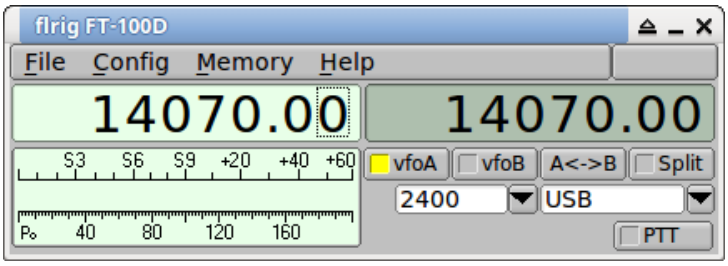

Figure 9.1 FT-100D

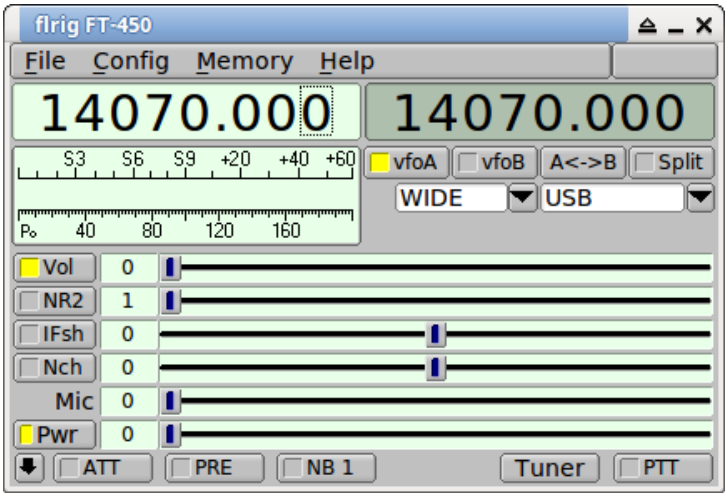

Figure 9.2 FT-450

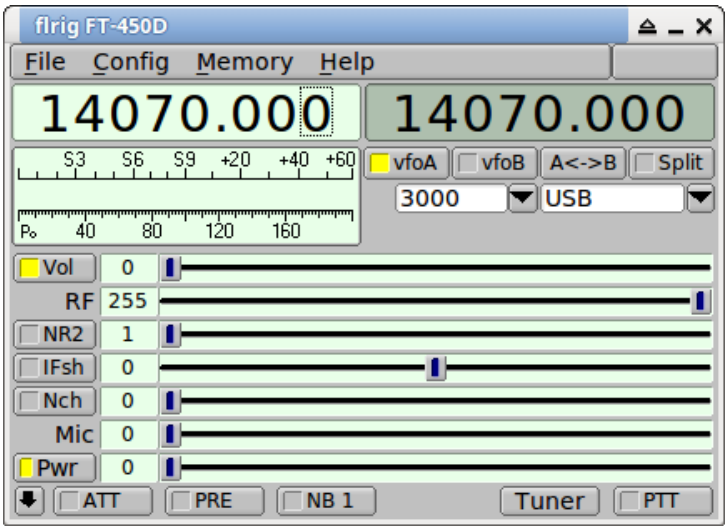

Figure 9.3 FT-450D

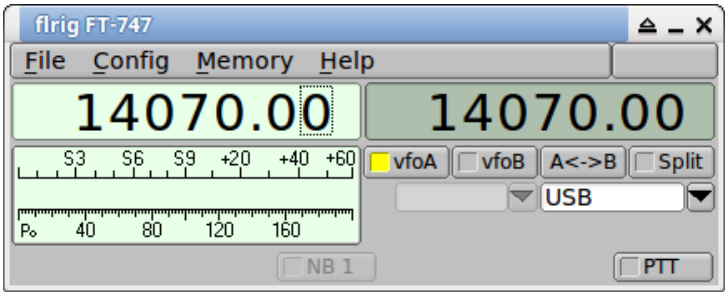

Figure 9.4 FT-747GX

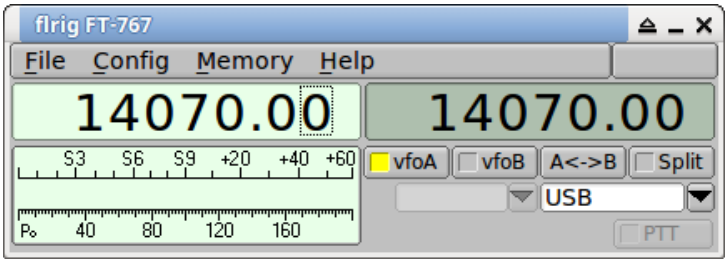

Figure 9.5 FT-767

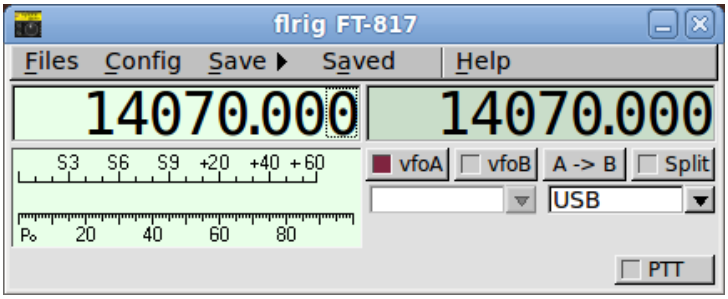

Figure 9.6 FT-817

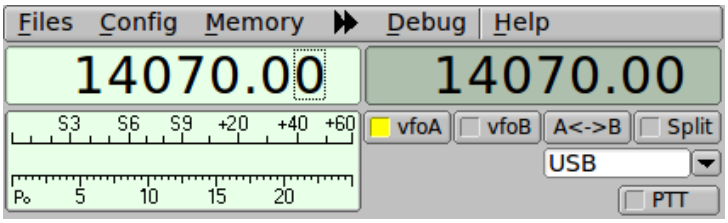

Figure 9.7 FT-847

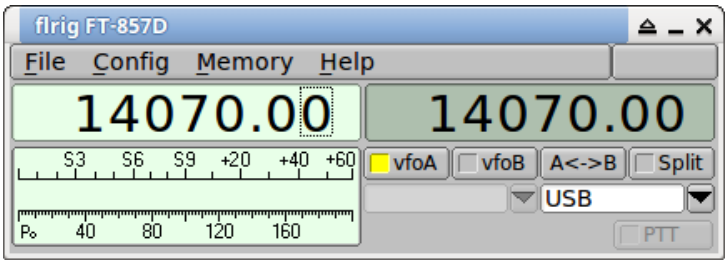

Figure 9.8 FT-857D

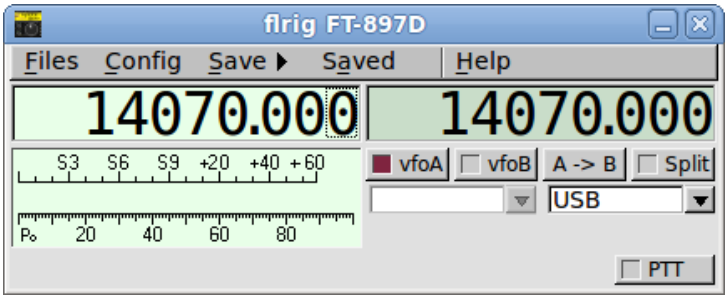

Figure 9.9 FT-897D

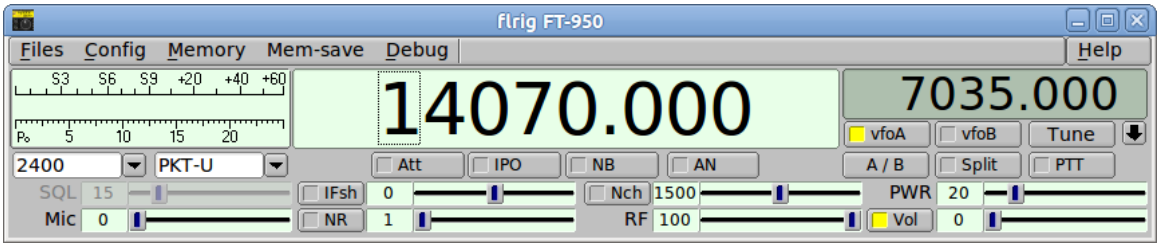

Figure 9.10 FT-950

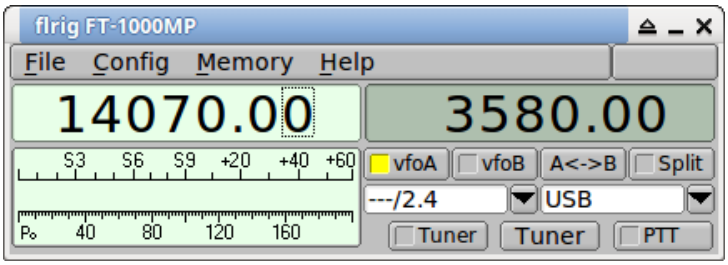

Figure 9.11 FT-1000mp

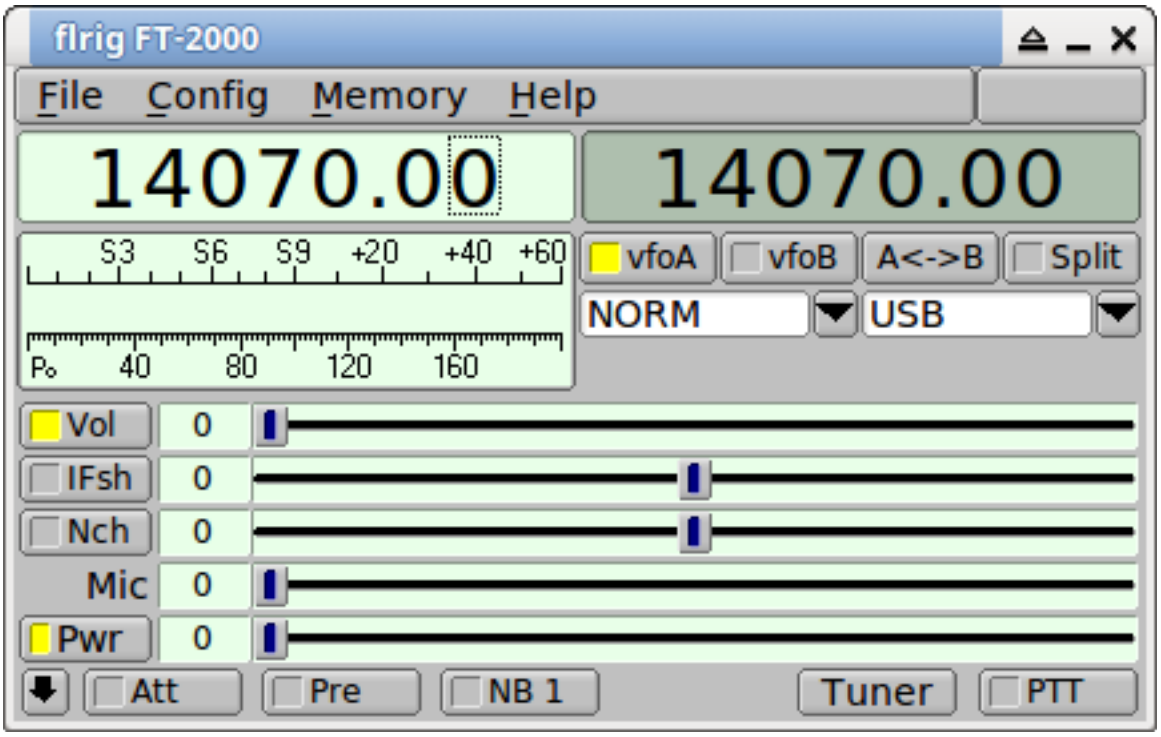

Figure 9.12 FT-2000

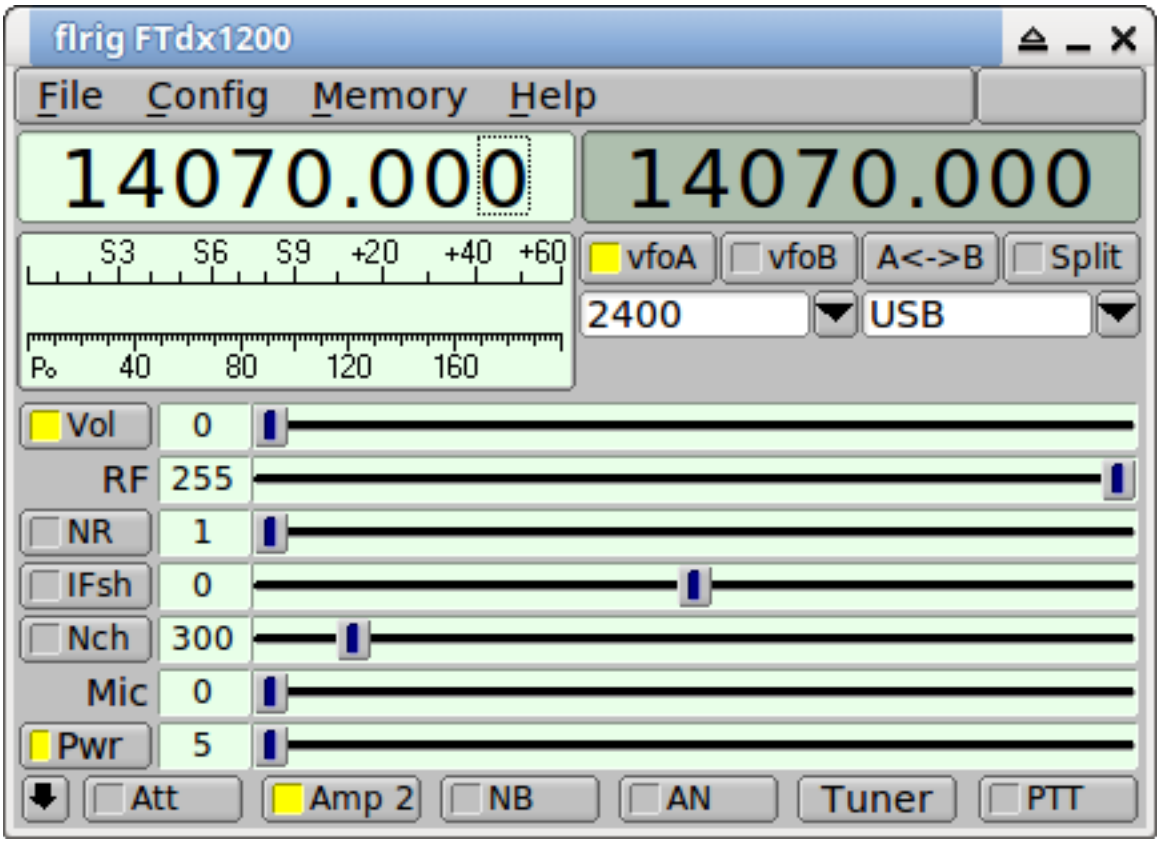

Figure 9.13 FT-dx1200

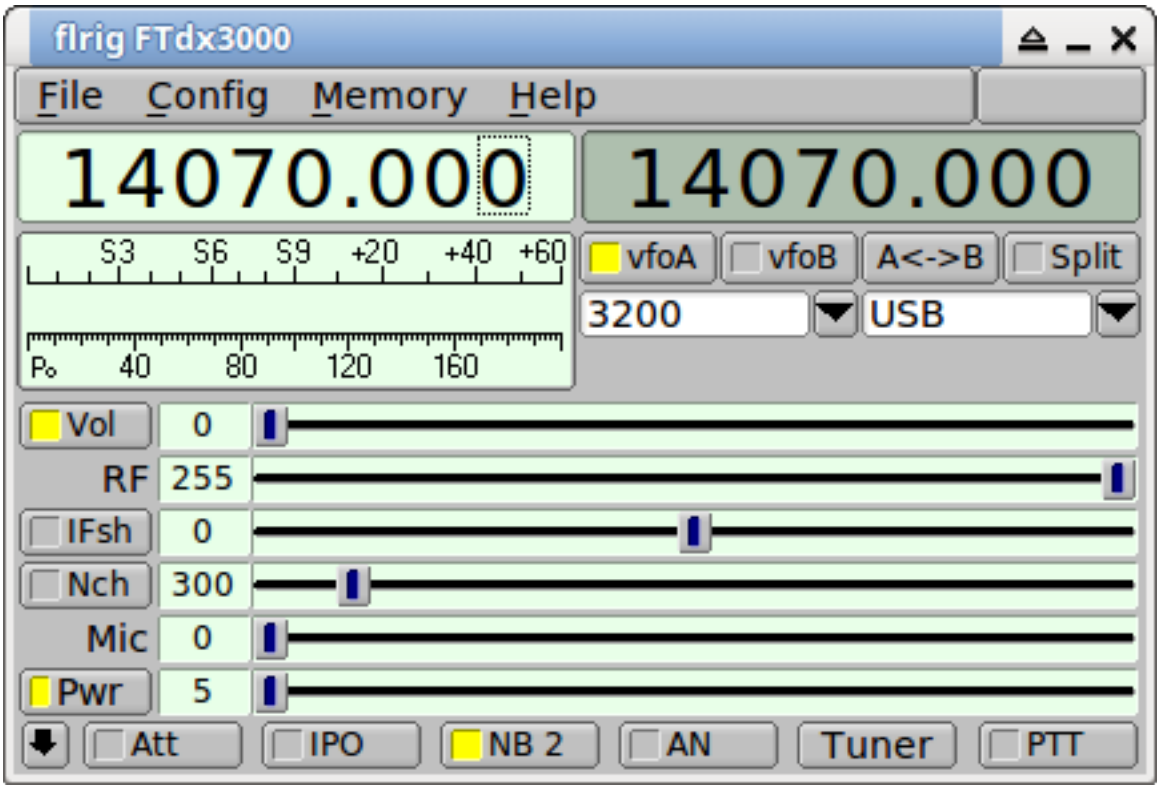

Figure 9.14 FT-dx3000

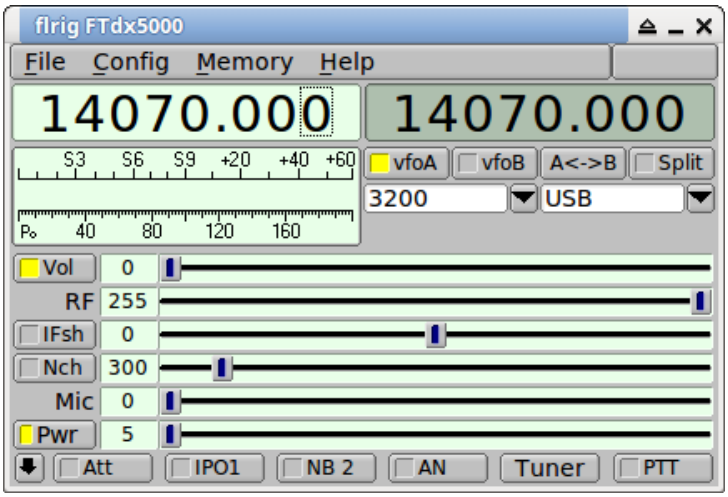

Figure 9.15 FT-dx5000

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Chapter 10

Other Supported Transceivers

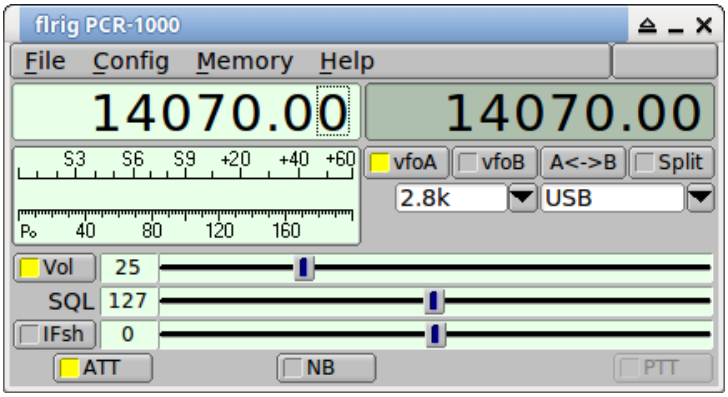

Figure 10.1 PCR 1000

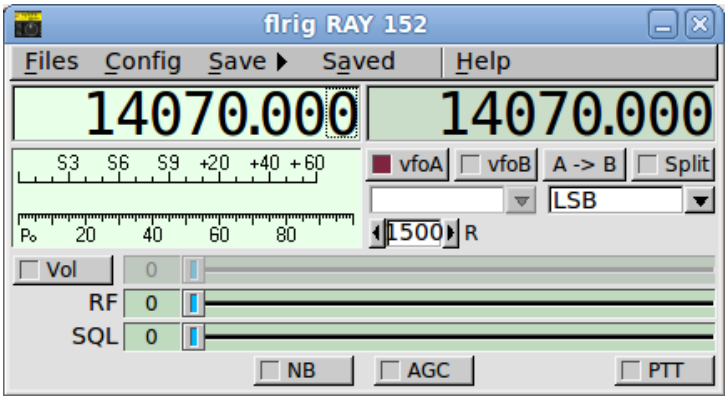

Figure 10.2 RAY 152

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