Configuring Digital Mode for Radios with USB

Introduction

Newer Icom radios are now equipped with a USB (Universal Serial Bus) interface. These radios do not require you to purchase, and use an interface (Rigblaster, Signalink[™]) to connect your PC to your radio to allow you to use digital modes on your radio.

Applicable Radios

This Guide applies to newer Icom HF radios with a USB interface, such as the IC-7200, IC-7850, IC-7851, IC-7300, IC-7610, IC-7600, and IC-7100.

Definitions

- USB Universal Serial Bus
- USB-D Upper Sideband Data Mode

Prerequisites

- A basic understanding of the Windows operating system, and configuration
- Successfully installed USB drivers for your radio
- The radio connected to your computer

COM Port assignment

- 1. Open the **Windows Device Manager** to verify which COM Port(s) are assigned to your radio.
- 2. Go to Ports (COM & LPT). Verify a Silicon Labs port is available with a COM assigned.

Some radios may have two of these devices listed. **Use the top most listed/first device** as your rig control COM port.



Windows Device Manager

	E Computer Management	
	File Action View Help	
	牙 Computer Management	▲ 🔩 TA11127
	🔺 🎁 System Tools	🔉 📲 Computer
	Description: De	Disk drives
	Event Viewer	▷ 📲 Display adapters
	Big Shared Folders	DVD/CD-ROM drives
	Local Users and Gr	▷ 🦣 Human Interface Devices
	Performance	IDE ATA/ATAPI controllers
	📇 Device Manager	Keyboards
	🔺 📇 Storage	Mice and other pointing devices
	闣 Disk Management	Monitors
	Bervices and Applicat	Multi-port serial adapters
		🖻 💇 Network adapters
		 Other devices
		http://www.ce
		Ports (COM & LPT)
		Communications Port (COM1)

Soundcard Settings

Output/Transmit device

The **Speakers USB Audio Device Driver*** provides sound data from your PC to your radio.

On your PC, go to: Control Panel > Speakers > Properties > Levels.

From here you can set your initial output sound level. Setting it to 50 will provide enough audio output to drive your radio. This adjustment is used in conjunction with the **USB MOD Level** setting on your radio for the most optimum signal.

* Note: In some installations the USB Audio Device may be preceded by a number and dash (example: 3 – USB Audio Device).

Go to the **Enhancements** tab and disable all audio enhancements. Keeping these enabled will distort your audio to the radio, making your signal unreadable to others, and cause interference.

Input/Receive Device

The **Microphone USB Audio Driver** receives the audio signal from your radio into your PC. The signal needs to be set at the best level.

Go to **Sound > Recording > Microphone > Levels**.

At **Levels** you can adjust the level of audio your PC receives from the radio. Setting the level to 50 for initial configuration then adjusting accordingly afterwards for optimum signal quality.



Radio Settings

Please refer to your radios' Instruction Manual for the location of these settings within the Set Mode menu.

Note: The IC-7300 is used for illustration purposes. The location of these settings will vary from radio to radio within the Set Mode menus.

USB MOD Level/DATA OFF MOD

The **USB MOD Level** is used with the **Speakers USB Audio Device** output from your computer. This modulates your radio when the radio is set to **DATA MODE**. Be sure to have **DATA OFF MOD** set as **MIC**, **ACC**. Changing it will disable your hand microphone when operating in non-DATA MODE.

CONNECTORS	2/4
ACC/USB IF Output Level	
5	50%
ACC MOD Level	
5	50%
USB MOD Level	
5	0%
DATA OFF MOD	
MIC,A	

DATA MOD

The **DATA MOD** setting is used when your radio is in **USB-D** (Upper Sideband – Data Mode). Here you select the connector(s) for data modulation input in data mode. When set to USB (Universal Serial Bus) all sound data is directed through the USB port.



CI-V Baud Rate / CI-V Address

The **CI-V Baud Rate** sets the data transfer rate between the radio and the radio control software. When set to **Auto** (default setting), the radio will set itself to the data rate set in the software. The **CI-V Address** is the address used to communicate to the radio. The only time this should be changed is if you have more than one of the same radio model connected to your PC.

	ТСОМ	HF/50MHz TRANSCEIVER	-7300
)	CI-V Baud Rate	zi-v	1/2
MPCH NOTCH	CI-V Address	Auto 94h	
NB NR AF - RF/SQL	CI-V Transceive	ON	TX/RX
	CI-V USB→REMOTE Tra	insceive Address 00h	5
			TUNE
	MENU FUNCTION M.S	SCOPE QUICK	EXIT

CI-V USB Baud Rate (7300 & 7851 only)

The Baud Rate sets the CI-V data transfer rate when remotely controlling the radios through the USB CI-V port. This setting is only valid when the **CI-V USB Port** setting is set to **Unlink from [REMOTE]**.



USB-D / Filter Settings

To use digital modes your radio should be set to **USB-D**. This can be set either on the radio, or by the software that you are using. Most digital mode software will display a 3kHz waterfall. Set your filter wide enough to display signals fully within the waterfall.



A word about ALC

In general, you should not see any ALC (Automatic Level Control) when working digital modes. The reason for no ALC on digital modes is that some of those modes (like PSK31) have an amplitude component to them. ALC will limit the output power by flattening the peaks of the PSK waveform. This creates distortion (IMD) which will make the signal wider and more difficult to decode. Modes like FSK (RTTY) have no amplitude changes, so ALC will have no affect on them. The amount of distortion that ALC adds to a PSK31 signal depends on the time constants of the ALC circuits in the particular transmitter.

Set your radio to Data Mode (LSB-D, or USB-D), set the power 90~100%, and use either the USB Data MOD setting or Windows Audio Mixer (USB Speaker CODEC device) to adjust your power output to approx 20W with Compression OFF. The reason for setting power control to maximum and adjusting the output power with the USB Data MOD setting (or the computer mixer control) is that the power control on some radios works by using the ALC setting to limit the power output. If you try to control the output in digital modes with the power control you will have a difficult time preventing any ALC.

If you set the power control on a 100W transmitter for 30W output, you will have ALC activity any time you have enough audio drive that approaches 30W. If you max out the power setting on a 100W transmitter you will not get any ALC activity until you approach 100W. If you then turn down the audio level to get 30W output you will be well below the ALC threshold. Consequently you won't have to worry about a few dB of filter ripple causing ALC on some parts of the audio spectrum.

Sample Configuration Setups

Here are some sample configuration setups. Follow the instructions for the software for properly configuring the software to operate with your radio.

Ham Radio Deluxe

To configure HRD Rig Control to communicate with the radio you will need to set the following:

- Company (Icom)
- Radio (your radio model)
- COM Port



🕤 Connect: KF2M in 🧮	Connect: KF2M in
Select a Preset or New definition and press 'Connect'	Select a Preset or New definition and press 'Connect'
New Preset Serial Ports Help	New Preset Serial Ports Help
Company: ICOM Status Radio: IC-7300 COM Port: COM11 Speed: 115200 CI-V Add: 94 Flow control / Interface power CTS DTR DTR DTS	Company Radio Port Speed CI-V Address CTS DTR ICOM IC-7300 COM11 115.200 94
Connect Always connect to this radio when starting HRD Rig Control. Auto Start Auto Start HRD Digital Master HRD Logbook HRD Logbook Entire HRD Suite HRD Satellite Track	Hemove Connect Always connect to this radio when starting HRD Fig Control Auto Exit HRD Digital Master Full Screen mode Intro Logbook Entire HRD Suite HRD Logbook HRD Logbook HRD Logbook HRD Logbook HRD Logbook HRD Logbook HRD Logbook

Ham Radio Deluxe/Digital Master 780

1. At **Soundcard**, set the Device Input and Output to Microphone and Speaker **USB Audio Device**.

Program Options		×
Appearance	Soundcard	
Callsign (My Info)	Input (Receive)	Headset Monitor
Clock		
Logbook	Device: Microphone (USB Audio Device)	Enable (will be grayed if not available)
Modes + IDs		Microphone:
PTT		Jack Mig (IDT High Definition Audia
Radio		
QSO	Output (Transmit)	Earphone:
Soundcard	Device: Speakers (USB Audio Device)	Commission Used borne (IDT -
Sounds		Communications Headphones (ID I
Storage		Monitor Voice (echo to headset)
SuperSweeper		WARNING Do not Fooble State according
Waterfall		soundcard is your radio!
Alama		
Alarms		Input (Receive)
Pavorites		for receiving signals, the line in is
Madas		connected to the audio output from
Navigator		your radio. 🗧
Navigator		Source: Select the input source -
Audia Pasandar		usually Line in. This fader is shown
Audio Recorder		to adjust the input level. Not all
Soundcard Calibration	Show sample rate in main status bar	soundcards have input sources - for
Time Synchronization		example the SignaLink USB does
Time synchronization	Show Supported Formats	sources.
		Output (Transmit) Device: Select the soundcard used
Getting Started	For recording and playback of wave files see: Audio Recorder	for transmitting signals, the speaker 👻



2. At the PTT tab, select Ham Radio Deluxe.



3. Customize your radio interface.

Configure Radio Pane: IC-7300 (Save Needed)			
HRD User Interface	Connect to HRD User Interface		
Address: localhost			
Port: 7809	Ham Radio Deluxe:		
Automatically connect	1 The connection uses TCP/IP - you must have TCP/IP started.		
▼ Mode ▼ Data	2 Make sure Ham Radio Deluxe (HRD) is started and connected to a radio (you must use build 1317 or later). ■		
▼ Filter ▼ AGC ▼ ATT ▼ Pre-Amp	3 In HRD select <i>IP Server</i> from the <i>Tools</i> menu, make sure the <i>IP Server</i> is started (DM780 will connect to the IP Server).		
	Configure Radio Pane:		
Image: TX Image: NB Image: NR Image: Notch Image: Tune Image: NR Image: Notch Image: Nt Image: Notch	1 Address - the address or name of the computer where the HRD User Interface is running, localhost (or 127.0.0.1) can usually be used to connect to the local computer, the actual network address is shown in the IP Server window.		
AF gain	Do NOT enter the address of the HRD Remote Server, always use the HRD User Interface address. Even if HRD is connected to a remote radio, you always connect to the HRD User Interface		
RF power	2 <i>Port</i> - the default port is 7809, use the same port		
PBT high	selected in the IP Server window.		
PBT low	3 Always connect to HRD - if checked an attempt is made to connect to HRD when the program		
Mic gain	starts even if not connected when the previous 👻		
Save @ Help	PTT - Select 'Program Options' from the 'Tools' menu		



📟 Digital Master 780 - [CW]		
Eile Edit View QSO Browser Logbook SSTV Data	Controller S <u>u</u> perSweeper World <u>M</u> ap <u>T</u> ools <u>W</u> indow <u>H</u> elp	_ & ×
09:04:02		
QSO SuperSweeper Radio Soundcard Data Controller Wa	Erfall Satellite Rig Control Logbook Rotator Program Options	÷ ÷
	▼ # cw - 🚂 💁 / Ø A - 🖽 - 😭 💶	25 AFC
<mark>ة 14.076.000 tions</mark>	Image: Two ⊕ 18 Filter: ⊕ ⊕ 1000Hz WPM: 18.0 , DSignal ∰9->N ™Options 8:58:59 AND- Main	
I CQ	FTT: Ham Radio Deluxe FSK FSK	
Image: Constraint of the state of	Input: Microphone USB Audio Device Output: Speakers	
ATT: Off Pre-Amp: 1	USB Audio Device	
TX NB NR 3) Him de Me AF pair: 12 5) Report, Nam 6) Station	8:58:59 AM> Main Pse K he, QTH	
RF gain: 100 osing		
RF power: 100 7) 73 (long) 8) 73 (video)	 i ▶ Send (F4) ⋈ Auto (F2) Pause (F3) Stop (F5) 只 Ø 圖 Q = ⊕ Repeat >> @ ■ Abort i Call CQ Reply Closing @ Default - 	
PBT high: 50		
PBT low: 50		_
Mic gain: 50		9
fault Tags	Enter text to be sent	1500 Hz IMD: S/N: 0dB
Recieve		
Keady	CPU: 0% Audio: 30% Overload MRD Logbook: Not Connected RSID OVR	CAP NUM SCRL 09:04

FLRig/FLDigi

FLRig

Configure FLRig to control the radio.

1. Set **Rig**, **Serial Port**, **Baud**, and **PTT via CAT** for your particular radio.

I/O Ports			
Primary XML TCPIP PTT Aux Poll Cmds Close Init <-			
Rig: IC-7300	Retries 4 2 DB		
Ser. Port COM11	Retry intvl 4 50		
Baud: 115200	Cmds 4 5 D		
🗹 1 🗌 2 -StopBits	Poll intvl 📢 200 🕨		
🗹 Echo	Byte intvl		
● PTT via CAT □ RTS/CTS	0x94 CI-V adr Default		
OPTT via RTS □RTS +12 v			
OPTT via DTR DTR +12 v	USB audio		



2. Set **PTT Port** to **NONE**.

I/O Ports		
Primary XML TCPIP PTT Aux PC	oll Cmds Close Init <=	
Use only if your setup requires a separate		
Senai Port for a		
PTT Port NONE		
OPTT via RTS	RTS +12 v	
○PTT via DTR	DTR +12 v	

3. Set desired **Bandwidth**, and **Mode**.

🖬 flrig IC-7300			
File Config Memory Help			
14070.150 14	070.000		
S3 S6 S9 +20 +40 +60 vfoA	vfoB A<->B Split		
3000	USB-D1		
Po 5 10 15 20			
□ Vol 16			
RF 2 -			
SQL 4 –			
□ Nch 0 ■			
MIC 10			
PWR 2			
Att □ Pre □ NB □ AN	Tune Tune		



FLDigi

1. Click flrig xcvr control with fldigi as a client to enable FLRig radio control.

Fldigi configuration			
Operator UI Waterfall Modems Rig Audio ID Misc Web Autostart IO PSM			
frig RigCAT Hamlib XML-RPC Hardware PTT GPIO			
firig is the preferred method of tranceiver control			
✓Enable firig xcvr control with fldigi as client			
firig xmlrpc server parameters these controls are mirrored on the IO configuration tab			
127.0.0.1 Addr 12345 Port Default Reconnect			
"Disable PTT keys modem if multiple instances of fldigi (client) are connected to a single flrig (server).			
✓Flrig PTT keys modem			
Restore defaults Save Close			

2. Deselect Use RigCAT.

🖪 Fldigi configuration 💿 🗉 🗾			
Operator UI Waterfall Modems Rig Audio ID Misc	Web Autostart IO PSM		
firig RigCAT Hamlib XML-RPC Hardware PTT GPIO			
Use RigCAT			
Rig description file: rig-not-assigned.xml Open	Device: COM18		
Retries Retry interval (ms) 2 10	Baud rate: 600		
Write delay (ms) Init delay (ms) 50 200	Stopbits 2		
○Commands are echoed			
□Toggle RTS for PTT	⊖Toggle DTR for PTT		
□RTS +12 v	ODTR +12 v		
ORTS/CTS flow control	OVSP Enable		
ORestore Settings on Close	Initialize		
1			
Restore defaults Save Close			



3. Deselect Use Hamlib.

Fldigi configuration								
Operator UI Waterfall Modems Rig Audio	ID Misc Web Autostart IO PSM							
firig RigCAT Hamlib XML-RPC Hardware PT	T GPIO							
 ⊖Use Hamlib								
Rig: Icom IC-7100 (Untested)	Device: COM9							
Retries Retry Interval (r	ns) Baud rate	: 19200 💌						
3	Stopb	its 🚺 1 🕨						
Write delay (ms) Post write delay	(ms)							
✓PTT via Hamlib command	Mode dela	ay 🜓 200 🕨						
Audio on Auxiliary Port	Sideband: Rig mo	ode 🖉 🔻						
ODTR +12	ORTS +12 ○CW	is LSB mode						
ORTS/CTS flow control	○XON/XOFF flow control ○RT	TY is USB mode						
Advanced configuration:								
		Initialize						
Restore defaults	Save	Close <=						

Audio configuration

4. Ensure that Capture and Playback are set to USB Audio CODEC.

evices	Settings Righ	nt channel	Wav						
	Ooss					De	evice:	V	
	PortAudio		Capture:	Microphone	(USB A	udio CODEC	:)	\$)
		·	Playback:	Speakers (JSB Aud	io CODEC)		\$)
	OPulseAud	io		Server string	:				
	□File I/O o	nly							
Re	estore defaults				ſ	Sa	ve	Close	