

Radio <-> Computer Interfacing

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Disclaimer !

- I'm no good at home brew
 - this is not about how to build an interface
 - no DIY advice
- I just want to operate radios, make contacts
 - this is all about 'plug and play' solutions
- Look after your 'Finals'
 - Data Modes are High Duty Cycle

What we'll (attempt to) cover

- **Examples of Radio Software**
- **The Internet**
- **Interface functionality**
 - Data, Control, PTT – what do you want your interface to do ?
- **Interface examples, Hardware & software**
 - Different PC configurations & Rig interface capabilities
 - 3 examples in detail
- **Considerations & pitfalls**
 - 3 areas: Computer, Interface, Radio
 - Objectives: Simple, Reliable, Clean, Safe
- **G4APD live demo**
 - JT65HF & Reverse Beacons (20W & the new Window)

Examples of Radio Software

(3 personal favourites)

- **WSJT** (Weak Signal Joe Taylor K1JT)
 - JT6M 6m Meteor Scatter – 6m is always open
 - JT65 on HF ~10db better than audible CW
 - 3 variants, more on this later
- **Faros** (fascinating propagation monitor)
 - Monitors 18 NCDXF Beacons on 5 bands 24x7
 - ‘Watch’ propagation switch from short to long path
- **Ham Radio Deluxe** (Swiss Army Knife)
 - Rig Control, Antenna Control, Logs, Maps
 - DM780 PSK31 system

The Internet (why ?)

- PC Clock Synchronisation
 - more on this later
- Real-time QSO logging
 - eQSL, LOTW
- Automatic 'dx spot' reporting
- Reverse Beacons via PSK Reporter
 - Real-time antenna & propagation results
 - more on this later

Interface Functionality

- **Data (QSO information)**
 - From Rig to PC – Rx Audio Decode
 - From PC to Rig – Tx Audio Encode
- **Control (Rig Control Data)**
 - From Rig to PC – e.g. Band Logging, Synchronise Rigs
 - From PC to Rig – e.g. Frequency control, Software PTT
- **PTT (Transmit Control)**
 - Software PTT e.g. CAT, less wires, needs SW drivers, risky
 - Hardware PTT e.g. RS232, needs SW drivers
 - Interface VOX e.g. Signalink, only needs data, reliable
- Don't assume that one interface fits all
 - You may choose to use different interfaces for different applications

Interface examples, hardware & software

(Different PC, Interface, Rig capabilities)

- **Computer**

- One Sound Card or Two ? – No Windows sounds please !
- RS232 COM Ports or USB ? Use USB drivers to create virtual COM ports

- **Interface**

- Homebrew, see rig manuals
- Isolation, no Rig / Computer earth loops please
- Level controls (useful when using Rig Accessory sockets)
- PTT VOX, reliable, low risk

- **Radio**

- Speaker & Mic connectors
- Accessory Socket (Audio In/Out & PTT)
- RS232 Ports
- USB

Interface examples, hardware & software

Example 1 – Any Rig, start by listening

- **Objective**
 - Start somewhere, get going quickly, see if ‘data’ interests you
- **Software**
 - Anything, but try HRD 5 and its DM780 PSK31 decoder
- **Interface Requirements**
 - Audio from Radio to PC (PSK31 signal to be decoded)
- **Radio**
 - Headphone socket
- **Radio <-> Computer Interface**
 - Stereo “Aux” cable
- **Computer**
 - Microphone socket
 - keep the PC Mic input level low
- **Radio setup**
 - USB, Rx Filter 3KHz
 - Keep the AF Gain very low

Interface examples, hardware & software

Example 2 – ICOM USB

- **Software**
 - Faros Beacon Monitoring
- **Interface Requirements**
 - Rig Control Data from PC to Radio (Software needs to switch bands every 3 mins)
 - Audio from Radio to PC (CW signal to be decoded)
- **Radio**
 - ICOM USB (B) Port
- **Radio <-> Computer Interface**
 - Ordinary USB A/B Cable
- **Computer**
 - Hardware Interface
 - USB A Port
 - Software Interface
 - Virtual COM Port Driver (Silicon Research Labs)
 - Omni Rig (converts generic Rig Controls from Faros to ICOM Software commands)
- **No Radio configuration needed, Faros controls Mode, Band changes, Frequency**

Interface examples, hardware & software

Example 3 – Generic Rig Accessory Port

- **Software**
 - JT65HF HB9HQX
- **Interface Requirements**
 - No Rig Control required (only change bands every few hours)
 - Rx Audio from Radio to PC, Tx Audio from PC to Radio
 - Tx PTT
- **Radio**
 - Radio Accessory Port with 1) Audio Out, 2) Audio In, 3) PTT
- **Radio <-> Computer Interface**
 - SignalLink USB Interface (Controls Audio Levels & provides VOX PTT)
 - SignalLink Radio Accessory Cable (Audio Out, Audio In, PTT)
 - USB Cable to PC
- **Computer**
 - USB Port
 - PC detects SignalLink automatically and installs CODEC drivers for 2-way Audio Interface (PC <-> SignalLink)
- **Radio configuration needed**
 - Select Band, Freq, USB, 3KHz Filter

Considerations & Pitfalls

• Computer

- Time Synchronisation Network Time Protocol (NTP daemon)
- USB / virtual COM Port Drivers try Silicon Research Labs
- OmniRig or equivalent so Radio Software can send Radio Control codes
- No Windows / System Sounds consider using 2 sound cards

• Interface

- Isolation No earth loops via PC
- Audio Level Control Easier than fiddling with levels on PC or Radio
- Some offer integral Sound Cards Simpler connections, avoids “You’ve got mail”
- PTT VOX, reliable, fail safe Software PTT does work, but use with caution

• Radio

- Frequency stability no drifty VFO’s, no good to you or anyone else
- Rx Filters wide Set to 3KHz, let the PC DSP do the work
- Rx AGC speed fast AGC on, but as fast as it will go (0.1s)
- Tx Filters wide (2-3KHz for AFSK) Software sets audio frequency (actual Tx freq.)
- Tx ALC level **ABSOLUTELY NO ALC reading**, at all, never
- Tx Audio or RF Compression No, same rules as ALC, turn it off
- Tx PA Drive Level Don’t overdrive a PA running at low power
- Work the world on low power 10–25W is enough & PA safe, 50W is considered QRO

Demo – JT65HF

- **G4APD**
 - 4G ‘hotspot’
 - Laptop
 - USB CODEC drivers
 - NTP daemon
 - JT65HF HB9HQX
 - Internet – pskreporter.info
 - Interface (data only)
 - USB cable
 - Signalink USB
 - ICOM Accessory cable (ACC 1)
 - Radio
 - Mode = USB Data
 - Frequency set manually
 - Antenna
 - Windom
- JT65 QSO format
 - CQ G4APD IO92**
 - G4APD K1JT FN20**
 - K1JT G4APD -11**
 - G4APD K1JT R-09**
 - K1JT G4APD RRR**
 - G4APD K1JT 73**
- A JT65 QSO takes 6 minutes
- 2.64 characters per second
- Full error correction