

Dayton 2015 Hamvention

Homebrew Radio

Dayton Hamvention 2015

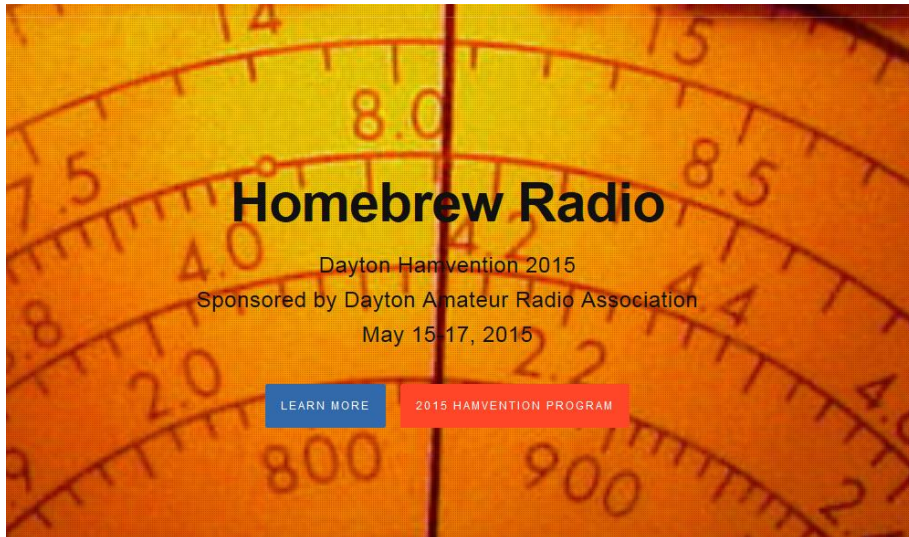
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May 15-17, 2015

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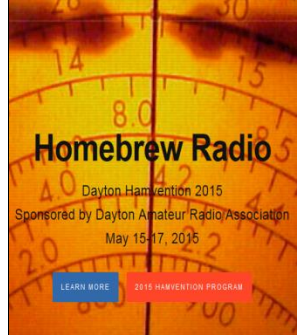
Homebrew RTTY Radio



Larry Gauthier
K8UT

May 16, 2015

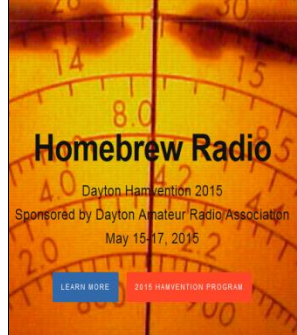
Hamvention RTTY Forum



Homebrew RTTY Radio

- Introduction
- Lingering Issues with RTTY Communications
- Commercial Remedies to one of the Issues
- Homebrew Remedies to one of the Issues
 - TinyFSK by KØSM
 - rpiFSK by K8UT

Lingering Issues



- Recent Improvements in RTTY **Dec**oding

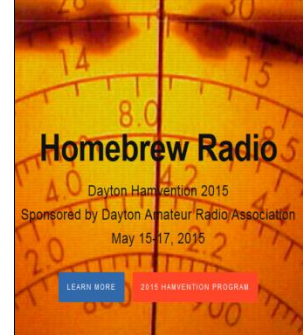
- New profile in MMTTY - FIR512 by Dave AA6YQ
- 2Tone by David G3YYD
- GRITTY by Alex VE3NEA

“Decoder improvements have reached a point of diminishing returns” – G3YYD

- No dramatic changes in RTTY **EN**coding

- Transmitted RTTY waveform
- Baudot character timing

Lingering Issues

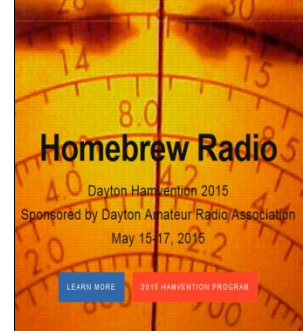


Transmitted RTTY waveform

- Suffer from the same rise/fall time problems as CW
 - The RTTY equivalent of “Key Clicks”
- You can clean up your RTTY waveform!
 - *RTTY Spectrum Measurement* by Andy Flowers KØSM
September/October 2014 issue of NCJ
 - Offers advice for both AFSK and FSK configurations
 - If AFSK and 2Tone user, consider running DOOK*
 - Controls the fidelity of the audio sine wave and the rise/fall times of the signal by changing audio amplitude

*DOOK = Differential On-Off Keying

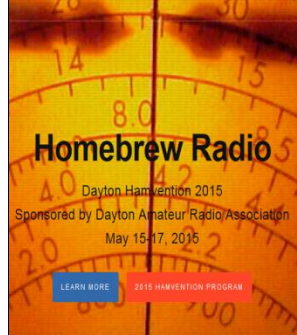
Lingering Issues



Baudot Timing on Windows

- Caused by underpowered or overburdened PCs
 - Browser, email, instant messaging, Windows updates, antivirus...
 - Logging program, multiple RTTY decoders, bandmap, packet spots, check window, callsign lookup, score summary, realtime scoring...
- Results in Baudot bit-jitter – timing errors in start, data, stop bits
- Possible solutions:
 - Buy a newer bigger faster computer *No!*
 - Do not install those extra Windows app *No!*
 - Eliminate some logging program functions *No!*
 - Dump Windows and go to Linux *Hell no!*

Lingering Issues



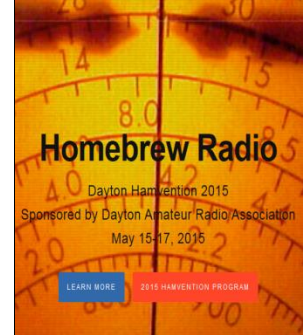
Baudot Timing on Windows

- An alternative solution: Outsource Baudot character timing
- Commercial products with internal bit timing
 - Traditional Terminal Node Controllers (TNCs)
 - HAL dxp38, Timewave pk232, Kamtronics KAMplus
 - Intelligent interfaces
 - microHAM *keyers and MK* series products, Timewave Navigator

Survey Says:

Only a small percentage of hams are using these commercial devices

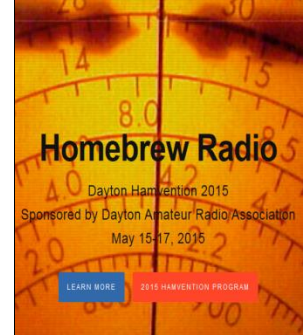
Lingering Issues



Baudot Timing on Windows

- Homebrew solutions: For the Do-It-Yourselfer
 - TinyFSk by Andy Flowers K0SM
 - rpiFSK by Larry Gauthier K8UT

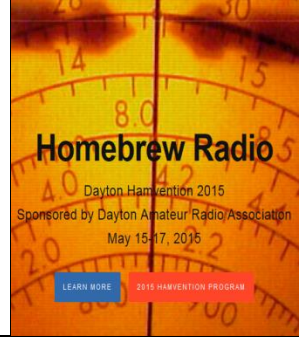
Homebrew RTTY Solutions



TinyFSK – What is it?

- Freeware RTTY modulator application written in C
- Written by K0SM in 2013
- Runs on an Arduino or Arduino-compatible single-board computer
- More information is available at:
<http://www.frontiernet.net/~aflowers/tinyfsk/>

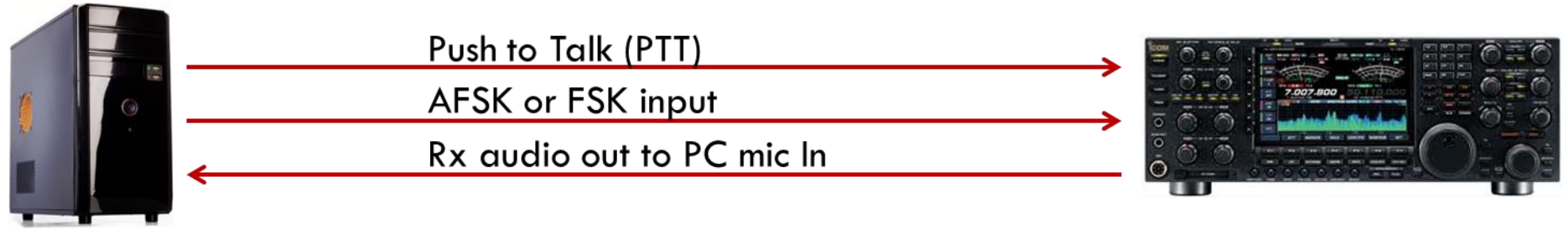
Homebrew RTTY Solutions



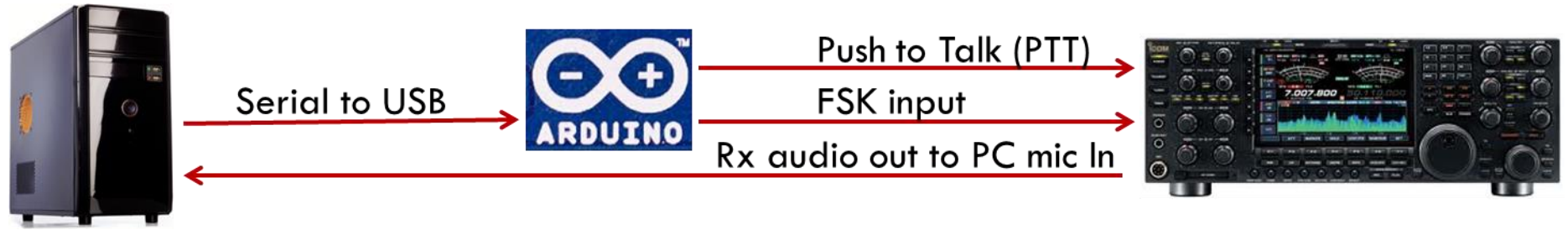
TinyFSK – What does it do?

- Converts an ASCII serial stream to PTT and FSK signals

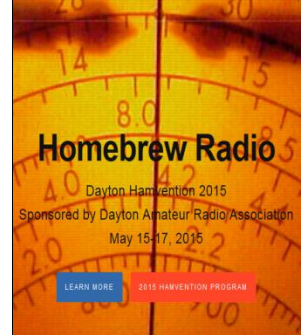
Before



After

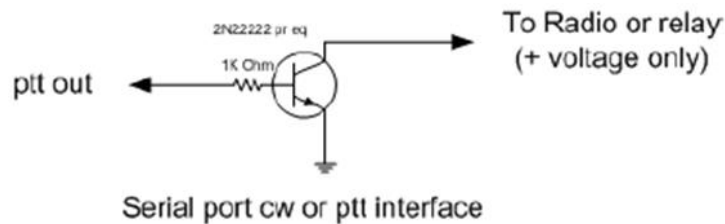


Homebrew RTTY Solutions

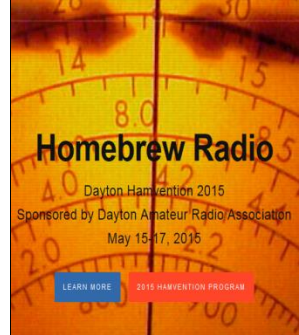


TinyFSK – What are the DIY project steps?

- Download and install the TinyFSK software
- Build two NPN transistor switches for PTT and FSK
- Attach a USBa-to-microUSB cable between the PC and the Arduino
- Build a serial cable between the Arduino and your radio
- Configure the logging program and TinyFSK to talk to each other



Homebrew RTTY Solutions



TinyFSK – What does it look like when it's done?

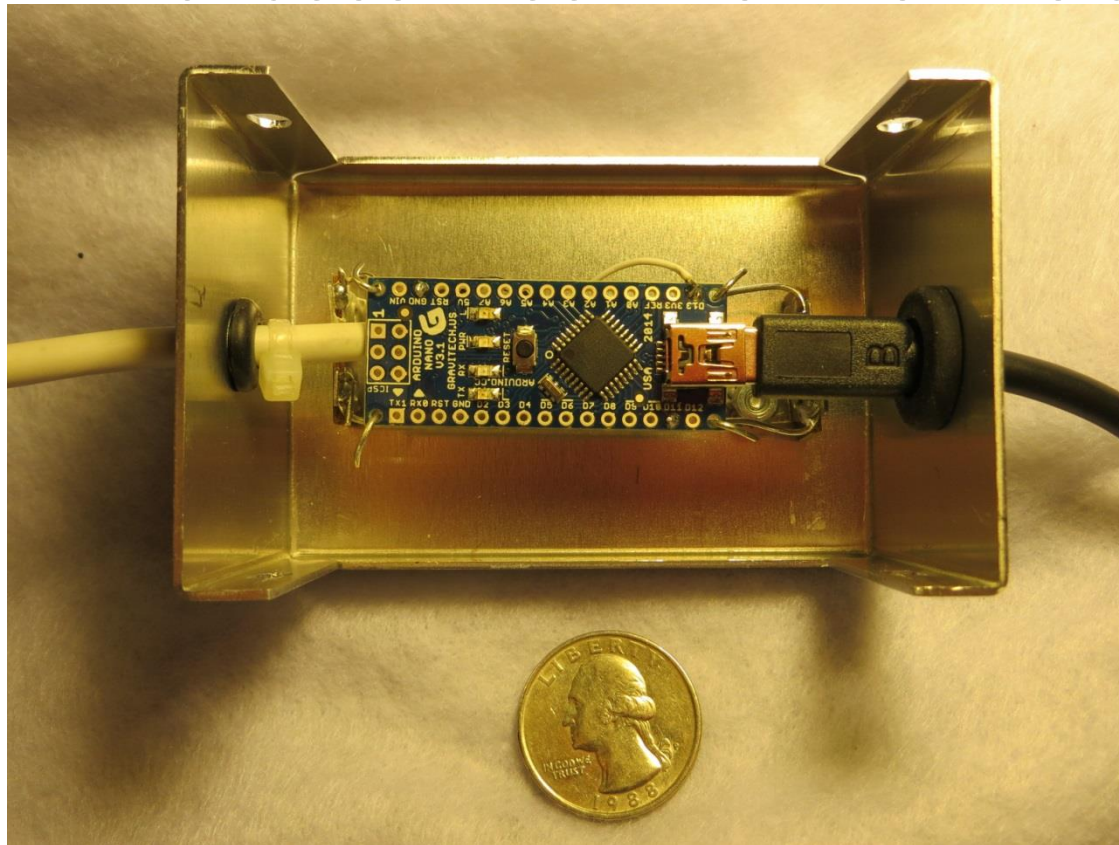
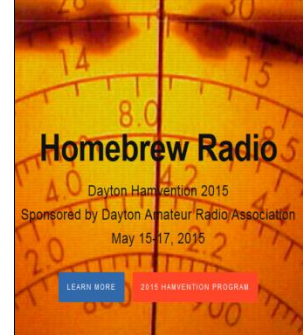


Photo courtesy Dave K8ESQ

Homebrew RTTY Solutions



TinyFSK – Will it work with my logging program?

- Full functionality
 - N1MM+ with 2Tone version 15.4 or later (TinyFSK menu choice)
 - N1MM+ with MMTTY and TinyFSK as a “Generic TNC”
 - DXLabs Winwarbler using the TinyFSK.txt external modem file
- Still testing – limited functionality
 - Writelog with 2Tone or a “110 Baud ASCII” option

These are the logging programs I tested. If yours is not listed, check with K0SM

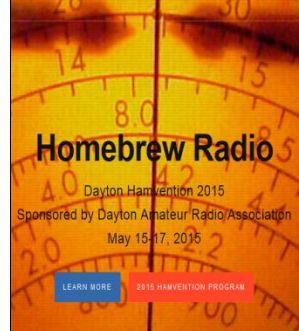
Homebrew RTTY Solutions



rpiFSK – What is it?

- Freeware RTTY modulator application written in C++
- Written by K8UT, beginning Fall 2014, still in beta testing
- Runs on a Raspberry Pi single-board computer
- Goal was interchangeability with TinyFSK
- More information is available at:
http://www.k8ut.com/tiki-list_file_gallery.php

Homebrew RTTY Solutions



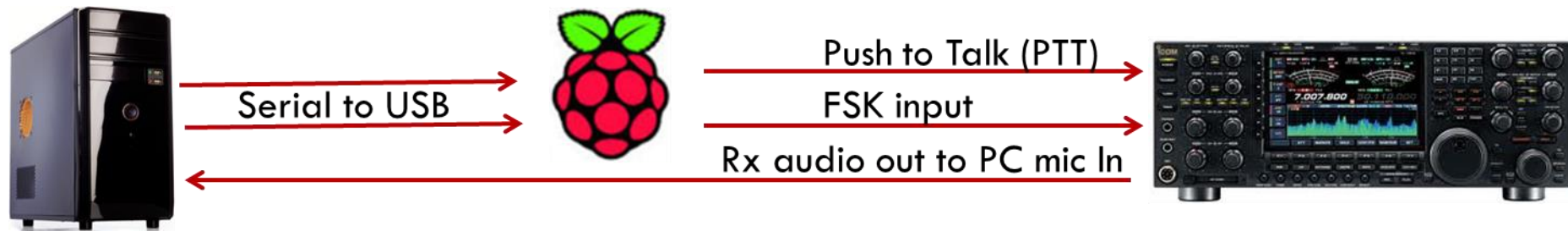
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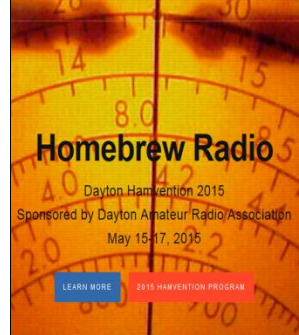
TinyFSK



rpiFSK



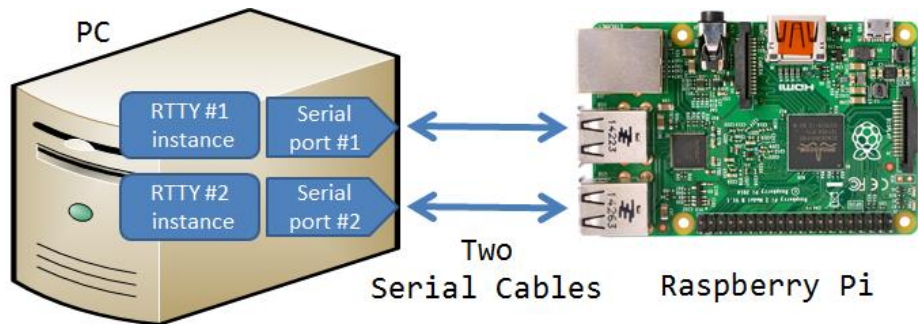
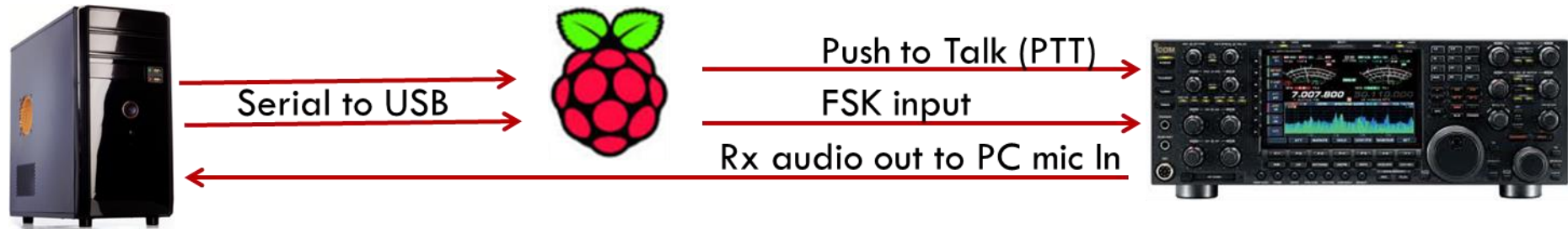
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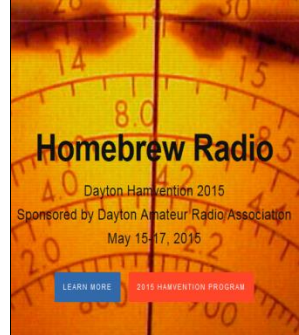
rpiFSK – What does it do?

- Single Operator 2 VFO (SO2V) diagrams

rpiFSK

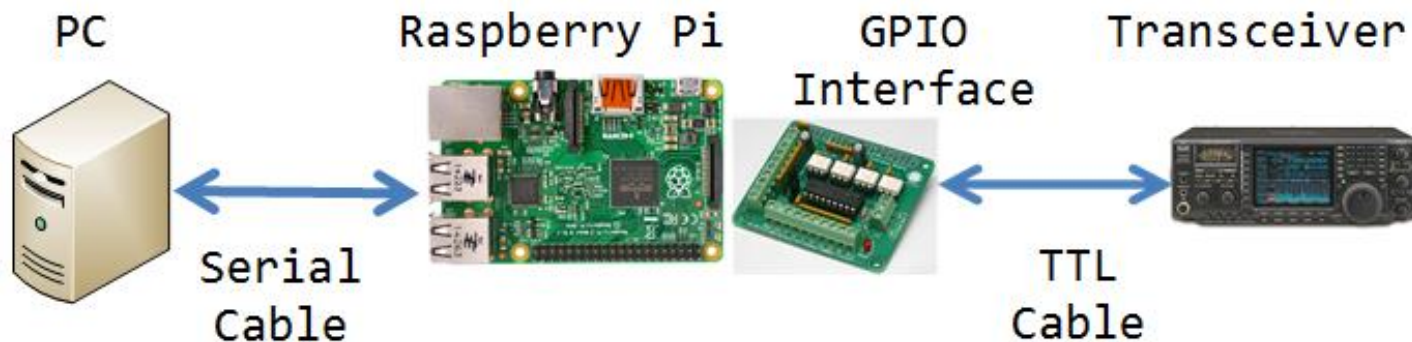


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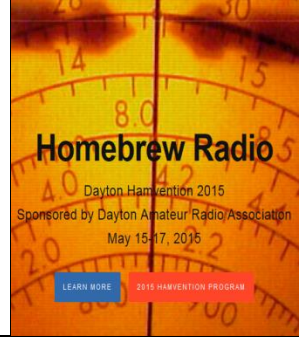


rpiFSK – What are the DIY project steps?

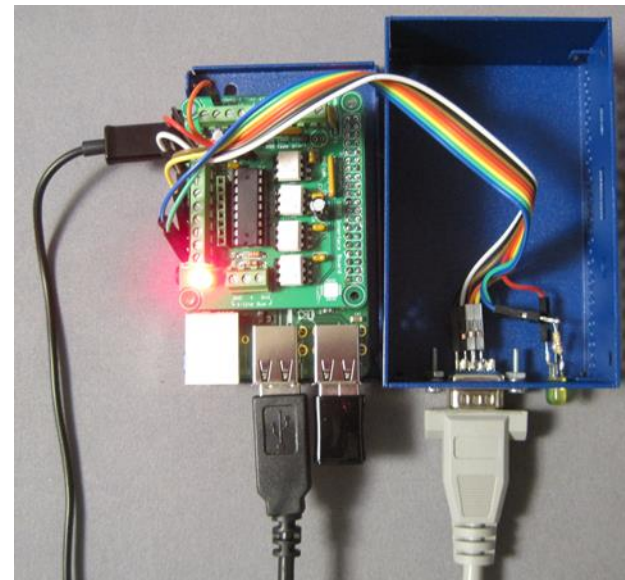
- Format and install Linux on the microSD card (its “disk drive”)
- Download and install the rpiFSK software
- Buy (assembled) or Build (bare board) a GPIO interface card
- Attach a *USB-to-USB null modem cable* between rpiFSK and radio
- Build a serial cable between rpiFSK and your radio
- Configure the logging program and rpiFSK to talk to each other



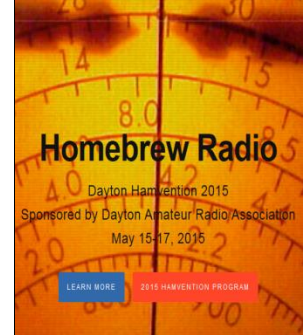
Homebrew RTTY Solutions



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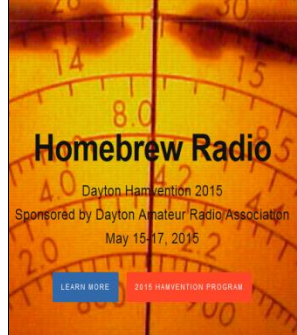
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- Also testing
 - Kamtronics KAMplus emulation – intent: any program that can talk to a KAMplus will work with rpiFSK. Does not look promising

Homebrew RTTY - Summary



TinyFSK versus rpiFSK - What's the difference?

- Do both solve the Windows bit-jitter problem? *Yes*
- Does one produce better RTTY signals than the other? *No*
- Is one project easier to build than the other? *tinyFSK is easier*
- Is one project more expensive than the other? *rpiFSK costs more*

- So... ummmm – why did K8UT create rpiFSK? ***good question!***

Homebrew RTTY Radio



Thank You!