SWD Radio tutorial notes

* Video 1
  + Parts to be used (maybe?) and basic ideas for design, schematic as well.
  + Conceptual design?
  + All the digital signal processing will be on the Teensy
* Video 2 (Quadrature Phase Oscillator)
  + Teensy drives the SI 5351
  + Multiple the selected frequency be 4 which goes to the jewel D Flip-Flop, which then clocks the devices and outputs the original frequency ( it divides by 4 as each flip-flop is a ½)
  + Input to the d flip flop is the clock signal
  + The output is also a 90-degree phase shift from the original signal
  + Reason for not having the si5351 generate the clock single directly is the drop-in amplitude which would then require and amplifier circuit
  + Feed the output of the clock to a few (2) 20k trim pots to get the desired 200 to 300 millivolts peak to peak voltage.
  + Circuit diagram at 6:40 in the video.
  + “Teensy and the Arduino IDE”
  + Code starts about 12min in
* Video 3 (Duel DC receiver Front end)
  + This fucker is already getting transmissions in?!
  + Decoded on SRD sharp using mic input
  + 2 Ne612 connected to
  + Si 5351 clocking the SN74HC74
  + 1000 ohm to 1000 ohm audio transformer
  + Audio amplifier – ne 2n3 904 feeding in to a lm386
  + 80/20 meter Band pass filter set connected to and rf amplifier to feeding to an rf splitter (ft 50-43)
  + Simple schematics show up at 5:21
  + NE or ED 612?
* Video 4 (Antenna RF Amplifier and BPFs)
  + Notes for this posted on the blog
  + Good for understanding the RF amplifier
  + Description of the mathematics, fantastic
* Video 5 (Audio Pass-Through Test Code) Very important for code understanding
  + Used Arduino system design online tool to implement code
  + The Tool he is using auto generates code for him based on basic design!
  + Lots of detail In early code work, can be vital to understanding his code as a whole.
* Video 6a and 6b (Hilbert Transform Filters) Very important for code
  + A Hilbert transformer (Band pass filter) is used to recombine the upper and lower sidebands of an outgoing RF signal.
  + He used 2 +/- Hilbert transform devices on opposite sides of the summer to get the 180-degree offset to generate the single sideband transmission.
  + This is done in the Teensy and then sent to the summer
  + To implement this in the Teensy is done by using a LOT of Hilbert transform coefficients to
  + Iowa hills Hilbert filter designer used to make the coefficients, set sampling frequency to 44117 for the Teensy.
  + Center frequency on the software above set to 1650hz, center of 300hz to 2.4khz. This is for audio input stuff
  + Number of taps set to 70 with a Kaiser window on. Time of 13mins about in video 6b.
    - It will have 70 coefficients because of the number of taps
    - Converted from text to Teensy format by python file.
    - The python file added brackets, multiplied by
* Video 7a and 7b (Transmit configuration, software on 7b)
  + Software sets microphone gain
  + Circuit diagram 2min 8 second mark
  + Circuit video 2 45seconds
  + Lower sideband testing 3min
  + Upper sideband testing 5:55seconds
  + Code at 8:14
    - Transmit test code
    - Mic gain defined in library’s on Arduino stuff
    - Same Hilbert transforms as the receiver
    - Audio shield on Arduino library is important
    - Really look in to turn on transmitter function, wtf.
* Video 8 (transceiver configuration)
  + On receive the transmit circuit is open circuited with relays due to noise through to audio
  + Using sdr sharp with a version 3 dongle to monitor the single on the transmission test.
  + Tests upper and lower side band
  + Sinc is the preferred filter option of the Kaiser?
    - Possible phase 2 improvement
  + Testing done on the 80-meter band.
  + RF shielding is vital to improve signal.
    - Put the RF oscillator off to the side and use RF coaxial cable for shielding purposes.
  + Software at 10:30mins
    - Only update the display when there is a change
* Video 9 (QSL on air talking)
  + At 15:39 he talks about a change by adding a power amplifier
* Video 10 (Power Amplifier Experiments)
  + None vital to SDR base radio, useful for actual transmission.
  + Circuit on screen at the start
  + Push-pull amplifier
  + Stripped biasing network to replace with a simple biasing network
  + Circuit he is using on screen at 1:40
  + 1k ohm resistor for power network instead of the 1.5k he had on paper?
  + Goes to 100 watts?!
  + 20 watts normal operation (his goal)