Technical Challenges Faced by TJ 40 DC RX Designers

* 9V vs. 12V:    Square batteries better.
* PTO: Improvement of the 3D printed inductor coil form.
* PTO.  Very simple Colpitts oscillator from Farhan could be made very stable. We discovered the importance of the 3.3k emitter resistor!  We used simple J-310 buffer circuit from Farhan’s Daylight Again rig.
* PTO:   Bad caps from the TJ Electronics Lab.
* Grounding the Brass Screw!   For PTO stability.
* No need to shield the PTO.
* Which mixer?  Two diodes or Diode Ring?  Diode ring better with AM Detection.
* No need to match mixer diodes.
* Using Farhan's cores.  How to prevent mixer mixups!
* Diplexer?   Yes for AM detection.  Which Diplexer to use?  We went with W7EL.
* What about the mismatch between mixer and AF amp?  Ignore it.
* BP filter:  Tune it low to help with Radio Marti eradication.
* AF AMP:  Discovery that Amazon AF transformers were bad!  Simple amplifier design:  Forrest Mimms and the Herring Aid 5.  Need for three common emitter stages.  Resistor across the pot.
* Big variations in Hfe of 2N3904s resulted in some AF amplifiers oscillating – this was solved by the placement of more bypass capacitance on the DC supply rail.

Lessons Learned From Student Experiences

For the students we had to work on:

Optimization of layout and build process

Manhattan layouts the flexibility of pads.

Making good solder joints

Short leads!

Polarity, diodes and capacitors

Identifying transistor leads

Importance of checking DC levels on transistor leads

Winding toroidal transformers

How to use an LC meter and how to adjust inductance by compressing or expanding windings

Removing the enamel from magnet wire and even from plastic insulated wire.

Simple test procedures and test jigs - alligator clip leads for speakers and batteries

Listening to an oscillator on a nearby receiver... The joy of oscillation

Understanding oscilloscope and VNA traces... Filter pass bands 00

Basic troubleshooting experience.