Sienna Construction Note
5/26/10

Rev B Hardware/Firmware Changes

Since we first introduced the Sienna, many hardware and firmware improvements have been made. Some were suggested as user-modifications, others were done as firmware upgrades. We have now released Rev B boards and Rev B firmware. The notes below explain the changes and how they may affect you if you have Rev A boards and/or firmware, and which changes are backwards compatible.

In general, Rev B boards require Rev B firmware. Rev A boards will work with Rev B firmware but will not benefit from the improvements.

Controller Board

1. Added "clickless" Sidetone circuit. The tone generator is left on all the time, and it is keyed on and off by the "Key" signal, except in FM mode, where the Key line is used to enable the transmitter and you don't want to have to listen to the Sidetone. A formerly unused bit on the Keyer microprocessor is used to determine if you have a Rev A (bit reads high) or Rev B board (bit reads low) and reverts the Sidetone to the original mode if you have Rev A.
2. LPTT, the main transmit/receive control signal, was split into two lines. LPTT was renamed LTxEn (Low-true Tx Enable) and only goes to the transmitter and amp. The new signal is LRxEn (Low-true Rx Enable) and only goes to the receiver. The timing is such that the receiver is disabled slightly before the transmitter is enabled, and re-enabled after the transmitter has been turned off and residual signals are no longer present in the receiver. This eliminates T/R "popping", which was evident mainly with QSK (Full Break-in). The lines were also converted to HCMOS levels (5V) instead of being pulled up to the raw DC input (11-15V). This eliminates the need for the added pulldown on the LPTT lines throughout the rig, which was described in a separate construction note. If using a new controller with an older transmitter, receiver or amp, all pull-ups and pull-downs on those boards must be removed.
3. Pressing the microphone's PTT switch no longer directly controls LPTT (LTxEn). The processor reads PTT and controls LTxEn itself. Since Rev B controllers require Rev B firmware, this change should not be noticeable. This change allows the processor to ignore the PTT line during power down modes to avoid inadvertently activating the transmitter.

Receiver Board

1. Added circuit to use LRxEn to force the RFG to min (except in Full Duplex). Rev A boards will continue to work as before.
2. Added new quad dac to control S-meter gain, noise blanker threshold (separately from the FM squelch control) and Hang AGC trip point. Rev A boards will continue to work, although some new menu items (AGC Hang, S-Meter Gain) will do nothing. JP4 selects either the FM Squelch dac or the new NBT dac to set

the NB threshold. This is reserved for future use and should be left jumpered to "sql dac".

3. The "Hang AGC" decay circuit now defaults to OFF, by installing a jumper at JP1 and removing jumpers JP2 and JP3. If JP1 is removed and JP2 and JP3 installed, the Hang AGC is enabled and a decay trip point can be set by using the new menu option "AGC Hang", which allows you to find a trip point for the AGC decay that is between that created by random noise and that created by a valid signal.
4. R102 was changed from 1M to 100K ohms. This improves QSK timing.
5. Added one pole of fixed audio tone control on the main speakers to reduce hiss.
6. Fixed the IF Out circuit as described in a separate construction note.
7. Added a 1.8K resistor across the differential inputs of the Product Detector to reduce noise.
8. Removed the LC Pi filter on the output of the Product Detector, as it added unnecessary parts.
9. Changed audio amp gain resistors from 620 ohms to 2.7K (R105/106/110/111) and changed capacitors C95 and C96 to .015uF to correspond. This improves the audio output slightly by reducing the sensitivity of the op-amp gain to the muting JFET (Q34) on resistance.
10. Added a ground trace shield around the Noise Blanker amp to eliminate any chance of coupling between the high gain Noise Blanker circuit and the normal high gain IF amplifier that follows it.
11. Eliminated separate meter control bit /MtrRx, which was redundant and /MtrTx, which was never used by the firmware. This presents an issue when using Rev A boards with Rev B firmware. The S-meter may not read correctly because of the added load caused by the FM RSSI signal. FM signal strength readings may not work at all.

Transmitter
1. Changed FM pre-emphasis coupling capacitor (C46) to .1uF. This makes FM audio and VOX detection work correctly.
2. Changed U14 (quad digitally-controlled-pot) from 50K (no longer available) to 10K. Changed values of mic gain circuits to compensate.
3. Changed pull-up voltage on R114 (Line-In (J6)) from 12V to 5V. This keeps digital modes from being clipped, improving IMD on transmitted digital signals.
4. Changed impedance matching on AM and SSB modes from mixer to first RF amplifier. Changes require Processor to be enabled in CW/FM/AM modes (even though not used), so signal can be routed correctly. On rev A boards, this causes unnecessary amplification, so Proc Level should be set to minimum.
5. Removed Class AB bias on the driver (Q3), which made this part run too hot.
6. Added an 8-input AND gate to the relay driver for the output low pass filters so that if a fault condition occurs during transmit, drive is removed, protecting the finals from damage.
7. Added a buffer stage to the TX Inhibit circuit to reduce output loading on the op-amp that disables the transmitter's TXPVCC line.

Firmware Rev B.01.00 – Main uP
- Restored usage of FullDup on Rx board to mean ONLY Full Duplex mode (goes with new HW, Keyer uP code change)
- Added support for new dac at addr = 6 on Rx board rev B (S meter gain, decay comparator ref, nb threshold
- Removed meter control bits 6 and 7 in strobe B - no longer used

Firmware Rev B.01.00 – Keyer uP

- Added control bit output for use with Rev B controller boards - LRcvEn is wider than the PTT output to mute the rcvr and min the RFG for much better QSK performance
- Added support for clickless sidetone - on Rev B, sidetone is left on, and CW keying is used to turn it on and off