

2304 MHz TRANSVERTER USING DUAL INTERDIGITAL MIXERS

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The dual interdigital mixer is an expanded version of the interdigital converter designed by Reed Fisher, W2CQH, first described in January 1984 QST and in recent ARRL Handbooks. The interdigital design was chosen for the following reasons:

- 1) No LO power splitter is required.
- 2) The local oscillator is at UHF frequencies.
- 3) Due to the high Q resonators in the mixer unit, external filtering of image and LO is not required.
- 4) The unit has reasonable conversion loss and noise figure.

The unit uses three Schottky diodes for LO multiplier, RX mixer and TX mixer. The multiplier and TX diodes are Hewlett Packard HP5082-2811 or Thomson-CSF BAR 11 units. The RX mixer is the HP5082-2835 or BAR35. The 540 MHz local oscillator signal is fed into the center of the dual mixer unit into the multiplier diode, where it is quadrupled to 2160 MHz. (I use 144.3 MHz for the IF, so the actual LO injection is 539.925 MHz, which is multiplied to 2159.7 MHz.) The resulting 2160 MHz signal is very clean.

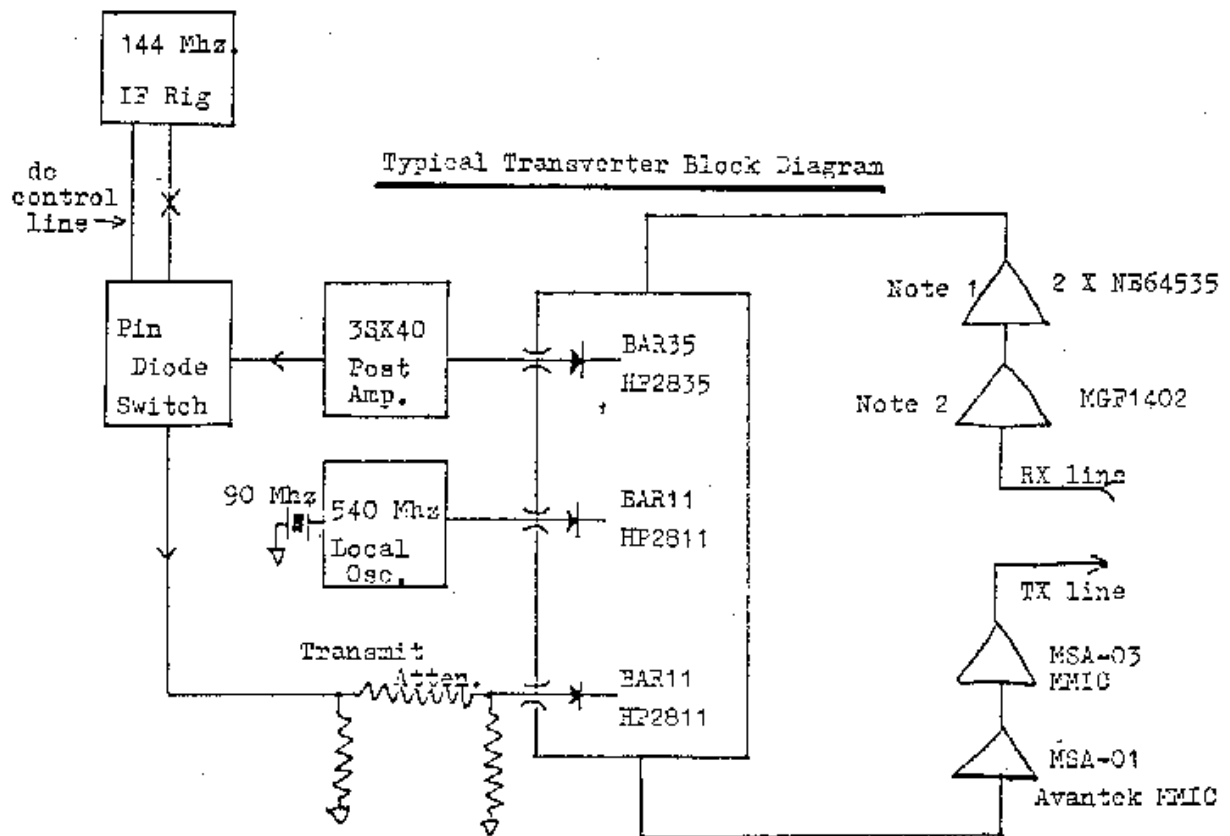
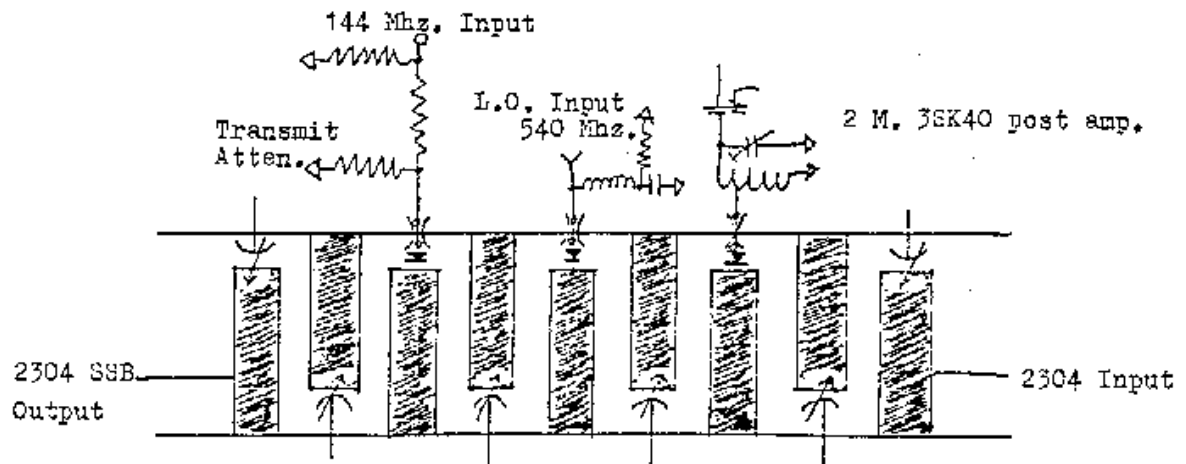
On the receive side, the 2304 RX signal is applied to the mixer diode and the 144 MHz IF signal is amplified in the 3SK40 post amplifier. In the TX mode, 1-2 mW of 144 MHz SSB is applied to the TX mixer through the appropriate attenuator from the IF transceiver. Power output is 100 uW or better at 2304 MHz. Higher power diodes could be used for the multiplier and TX mixers to get more power. With these diodes and several MMICs, you can generate 10 mW or so. No external filtering is needed. The image, local oscillator and spurious signals are down greater than -30 dB. Noise figure is usually less than 10 dB, but with several stages of gain ahead of the mixer, this is overcome.

This type of transceiving mixer has been used with success on 1296 and 3456 MHz as well. All brass parts, including the tuning screws, should be silver plated for low loss and long life.

The local oscillator is straightforward using a 90.0 MHz crystal multiplied to 540 MHz. Power out of the oscillator chain is in excess of 300 mW. The output and diode current of the multiplier diode can be set using a 500 ohm potentiometer in the collector circuit of the last device. SD1598 transistors by Thomson-CSF were used for the last two stages; they are similar to 2N3866s but are in a stripline package. Tune up of the LO and mixers requires a spectrum analyzer. If you are building 2.3 GHz equipment, you probably have access to one.

My IF transceiver is an ICOM IC-202S 3-W SSB/CW rig. DC voltage is taken from the transceiver in the TX mode and used to operate the PIN diode RF switch and dc switching needed to operate the transverter. An attenuator is needed on the transmit side since only 1-2 mW is needed to drive the mixer diode.

2304 Mhz. Dual Interdigital Mixers



Note 1: 2304 Preamp, KA1GT Aug. 1981 QST

Note 2: 2304 GaAsFET preamp, K2UYH

