HI-FI SOUND ON 24CM ATV

By G8MNY

On testing several 6MHz intercarrier designs, I found most of them don't come up to scratch, some don't attempt any of the accepted standards. Give your Tx the square wave test at 10% level & see how bad it is.

Try going through these check items:-

TX Check list

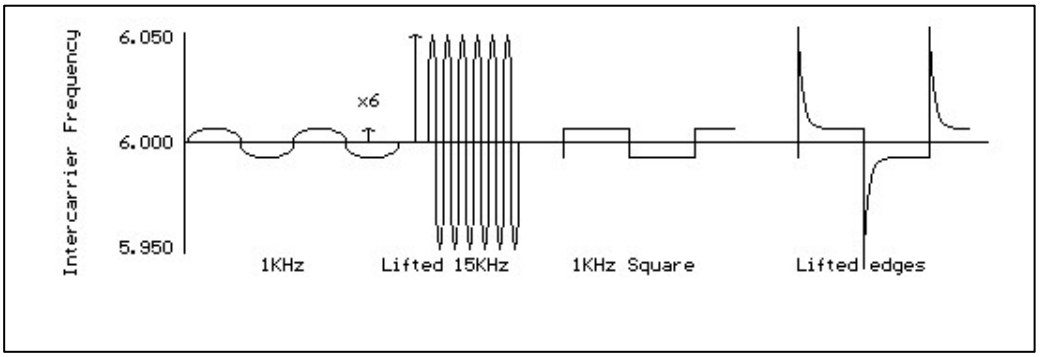
1. Check Tx is on 6.000 MHz? (error of 5KHz means 10% off channel).
2. Deviation limited to 50KHz?
4. Deviation symmetrical?
3. 75uS (or 50) pre-emphasis working? (6 times 1KHz level at 15KHz)
4. Is there a vision trap at 6MHz?
5. 6MHz injection level adjustable to -15dB of carrier.

Rx Check list

1. Rx has 6MHz filter?
2. Discriminator is centred on 6 MHz?
2. 75uS (or 50) de-emphasis working? (15KHz 1/6 of 1KHz)
3. LF ok down to 30Hz?

STANDARDS
The 75uS emphasis standard should be used for amateur work, as this will give best improvements on distortion & noise with "non music" audio. There is only a 3 dB difference in HF lift between 50 & 75uS standards anyway! The deviation should be set at 50KHz as this is the width 6MHz Rx filters are designed for.

When tone testing make sure your not over loading the modulator, by starting with the uplifted 15KHz first & checking the deviation. It is best to limit (clip) the deviation by using a pot after the last AF stage see Fig 1.



DEVIATION
The correct deviation can be set up by using a DC scope & a frequency counter or HF Rx. (NB. counter may pull the osc when connected!). First set frequency to 6 MHz, then put the scope probe on the output of the preset deviation control. Connect up a pot (1k-100k) across a supply rail & use the DC on the slider to swing the opamp's bias up & down, & hence the Varicap DC high & low.
This then lets you calibrate the scope for 50KHz points (note it wont be symmetrical due to the Varicap characteristics). Now remove the added bias circuit & apply overloading audio, & adjust the deviation preset so that the clipped waveform is at the same level.

IMPROVEMENTS
I noted that most circuits use a 100K series resistor to feed the varicap. However the capacitance of the varicap diode with a 100K, may be high enough to cut the HF response at 15KHz, so use a 47K. (2 100K in parallel)

Opamps can also cause problems if they are pushed to there "gain bandwidth product" limit. Remember the amp doing the pre-emphasis has to give 6 times more gain at 15KHz, so limit the gain used to a sensible value, and stick another opamp front if need be.

In the Rx there is not too much to go wrong, possibly the de-emphasis CR value is of bad tolerance, or the Cs in the output amp are to low for the LF response needed for that 21 gun salute video etc.

RESULTS

So far the "tune ups" have been very good, with a 30Hz-20KHz frequency response to the -3dB points instead of the 200Hz-4KHz starting point. The mono output is now good enough to go into HiFi system, & those steam engine videos now not only look good but sound good too.

Under marginal signals (P2-3) best results are obtained when modulation levels are maintained at just under clipping level, I use a audio AGC limiter circuit to give high levels with minimal risk of overloading, but watch out for excessive compression!