

SETTING FM LEVELS

By G8MNY

For FM ATV there are 2 deviations & 1 injection level to set:-

- 1/ The Video Peak-to-peak. +/-3.5MHz
- 2/ The sound sub-carrier injection. -18dB on peak-peak vision (+/-3.5Mhz).
- 3/ The sound sub-carrier deviation. +/-50KHz

VIDEO LEVEL

If hard video clipping was used after the pre-emphasis the clip points could be accurately set to full deviation, but with colour & sound sub-carriers this would cause problems. A SatRx is designed for wide deviation so correctly adjusted ATV modulation levels will be seen as quite underdone on an unmodified SatRx. The Video peak to peak is difficult to measure as the pre-emphasis means even on a calibrated oscilloscope & discriminator, there is little to see of the wide deviation caused by the spiky video edges.

A better approach is to set the LF deviation some 14dB below the maximum. This allows for the edges that can be lifted 14dB by the pre-emphasis CCIR network. Although the largest video edge swing is only 0.7V at any one time, allowance for the sound subcarrier component of deviation will take up this small error.

14dB down on +/-3.5MHz = 1.4MHz peak-peak or 932KHz White-Black.

With a 50Hz 1V peak-peak square wave or 1/2 white/black video (top & bottom of frame) the measurement can be made several ways:-

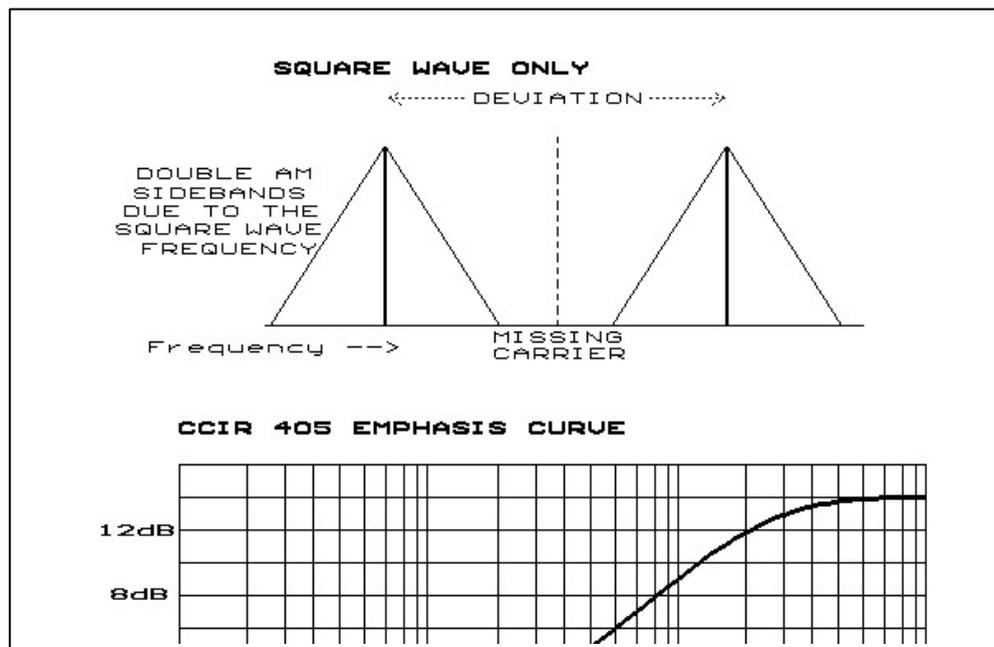
- a) Calibrate a Rx, (no AFC) connect the discriminator DC O/P to an

oscilloscope & the Tx (or an IF osc) connected to a frequency counter. QS the Tx/osc 1MHz & calibrate the scope trace. Then apply the test waveform & adjust video gains for the correct LF deviation.

- b) A narrow band scanner can also be used either on 23cms or on a Rx IF. Then 2 methods can be used:-

The 1st carrier null method, with FM this occurs at a M.I. of 2.4. So for +/-3.5MHz deviation a 1V peak-peak test video carrier of 1.46MHz is needed. This may not be practical as the pre-emphasis in the video circuit will not be flat at this frequency (+11dB?) and confuse the calibration process! However if testing just the UHF Modulator it will be OK.

The second method it just to tune in to the 2 energy peaks that correspond to the 50Hz square wave steady states or 50Hz White-Black picture frequencies, and



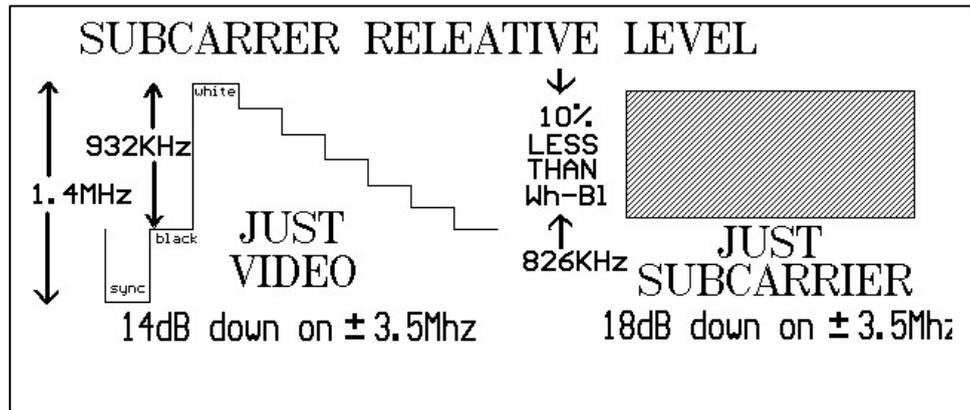
adjust the video gain to obtain the desired deviation.

c) Use a spectrum analyser to do the any of the above.

SOUND SUBCARRIER LEVEL.

The recommended level is -18dB, this is 8dB weaker than for an AM TV broadcast systems, but making it any stronger greatly increases the bandwidth used for FM ATV. Although this level looks large compared with the LF video in the sketch, it is soon lost in the HF Rx noise as FM noise is proportional with frequency (6Mhz) in a Rx.

The simplest method is to scope the peak-peak level sub-carrier injection level just before the UHF Varicap diode (not UHF point) with a high impedance oscilloscope probe. For 18dB below the peak-



peak video deviation this peak-peak level is just 4dB below the LF video level. This is 1dB (10%) less in amplitude than the black to white of the picture.

SOUND DEVIATION.

This is also pre-emphasized (on some Tx) and as it contains no added sub-carriers (eg no MPX stereo/data) it can be allowed to clip in an AF amp. As the audio is weak link on ATV some amount of AF clipping (not over deviation) can be an advantage.

Deviation can be set up by using a scope and 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 and use the DC on the slider to swing the opamp's bias up & down, and 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.

For more info on..

HiFi sound in CQTV 159 page 34.

FM ATV Spectrum in CQTV 179 page 76.