

NEWSLETTER ARCHIVES

USE OF TELEPHONE TONE PAD IN TWO-TONE TESTING

We all know that the ideal way to tune up a SSB transceiver or linear amplifier is to use a two-tone signal. This allows the amplifier to operate at its designed maximum power without the excessive dissipation that would result from using a continuous audio signal. The two-tone signal also allows a rough assessment of the amplifier linearity to be made by looking at the amplitude envelope on an oscilloscope. Whilst a single tone generates a carrier with constant amplitude, two equal amplitude tones each generate a pair of carriers that beat to cause an envelope that varies between zero and twice amplitude of the tones. This in turn causes the power to vary between zero and four times the single amplitude power.

Because SSB transceivers do not include an internal two tone generator, most amateurs tune up either by changing mode to a constant carrier mode such as FM, or by changing mode to CW and sending a string of dots, or by shouting "wharlor" into the microphone. The first two approaches do not allow us to tune up and monitor the behaviour of the transceiver in a mode that simulates voice operation, whilst the latter approach does not yield a constant amplitude suitable for making measurements.

It has been noted in TT and elsewhere that telephone dialling tone generators could form the basis of a two-tone generator without the complexity of building a pair of oscillators and combining their outputs. Even if one built the two-tone generator it would then have to be wired into the transmitter with all the issues of connector pin-out, microphone impedance etc.

In the past few years a number of tone diallers have appeared on the market which are designed to be placed across the mouth piece of a pulse dialling telephone to allow it to access tone based network services such as voice mail, computer integrated telephony applications, or to remotely control answer-phones etc. It occurred to me that these would make excellent two-tone generators for tune-up and testing. They are designed to generate a sound pressure at the microphone at about the same level as a person speaking. All one has to do is to place the keypad over the transmitter microphone, key the transmitter (or switch to VOX), and press one of the numbers on the keypad, and a pair of audio tones will be generated.

I have tried using one of these with my TS-940S and monitoring the transmitter output. The transmit envelope shows the classic two tone beat pattern, and the peak output seems to be at the same level as voice output. The tones generated are:

1209 Hz	1336 Hz	1477 Hz	
1	2	3	697 Hz
4	5	6	770 Hz
7	8	9	852 Hz
*	0	#	941 Hz

None of the pairs are harmonically related, and the tones need to be reasonably pure, or the tone detector used in the normal application of these devices would register incorrect values. These keypads are available from BT, Radio Shack and a number of the shops in Tottenham Court Road at a price of about £10.00.

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