EQUALISING THE TRX-2 OUTPUT POWER

The Juma TRX-2 has a somewhat 'hidden' feature whereby you can set the output power of the transmitter on all bands to be essentially the same despite minor variations in insertion loss of filters, and the varying gain of the output amplifier with frequency.

This attenuator selection feature is enabled by setting the mode to TUNE, pressing and holding the PTT switch, and then holding the PWR button down. The display will then change and will appear as below.



TX Attenuator Adjustment

To select an attenuator, rotate the VFO knob, and you can select one of four attenuation levels from 0dB to -3dB in 1dB steps.

To equalise the output power you will need to measure the output on all bands and at all attenuator settings, and tabulate the results:

Band, Metres	0dB	-1dB	-2dB	-3dB
160	7.2W	5.6W	4.2W	3W
80	7.4W	5.8W	4.5W	3.3W
40	7.5W	6.1W	4.9W	3.7W
30	5.6W	4.9W	3.6W	2.8W
20	7.0W	5.6W	4.5W	3.4W
17	5.2W	4.2W	3.3W	2.6W
15	5.9W	4.8W	3.8W	2.9W
12	6.2W	5.0W	3.9W	3.0W
10	4.9W	4.0W	3.2W	2.5W

In this case you can see that using the 0dB attenuator the highest output power was 7.5W, and the lowest 4.9W.

Examine the results, and set the attenuators such that on the band with the lowest output power the attenuator is set to 0dB, and the other band's attenuator setting give a matching output power. In my case this would be:

Band:	160	80	40	30	20	17	15	12	10
Atten:	-1	-2	-2	-1	-2	0	-1	-1	0
Atten:	-2	-2	-3	-2	-2	-1	-2	-2	- 1

Note that the second row shows an alternative setting using slightly lower overall gain, but achieving the same result. As you select the various bands, the attenuator setting will be preserved and saved to the EEPROM when the transceiver is powered down, thus you only really need to "calibrate" the transmit chain once.

It was whilst making these adjustments that I discovered that initially my 40m output was about 3dB lower than the rest. A careful check with my sampling oscilloscope showed that the culprit was the 4Mhz - 8MHz input filter formed with C25, L15, C26, L16, C27, C28, L17, and C29. A close examination showed that one side of C26 had not been soldered. When this was corrected, the measured filter insertion loss was:

Band (Metres)	Filter (MHz)	Input (mV P-P)	Output (mV P-P)	Attenuation dB
160	1 - 2	808	648	-1.92
80	2 - 4	808	688	-1.40
40	4 - 8	752	744	-0.09
30	8 – 15	920	680	-2.63
20	8 - 15	744	752	+0.09
17	15 - 30	904	656	-2.79
15	15 - 30	792	688	-1.22
12	15 - 30	752	680	-0.87
10	15 - 30	784	670	-1.36

The output power was set to about 1.8W on 160m just to keep the signal levels well within the derating range of both the oscilloscope input and the x10 probe used.

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