

PREAMP VARIATION WITH PARTICLE SCATTER

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We have been undertaking a number of experiments using particle scatter and have reported on these in previous notes:

http://reast.asn.au/optical/VK7MO_VK7TW_Part particulate_Tests_20070822.pdf

http://reast.asn.au/optical/VK7MO_VK7TW_Part particulate_Tests_20070901.pdf

This note covers comparisons performed between using the VK7MJ designed photodiode preamp and the KA7OEI designed photodiode preamp (Version 3.02).

Both receivers and the transmitter were setup at 35 degrees elevation and using WSJT it was found that the difference between the VK7MJ and the KA7OEI preamps was 12 dB in favour of the KA7OEI preamp. This correlates to the measurements undertaken by KA7OEI (see results at: http://ka7oei.com/optical_comms/optical_rx1.html for details). The lens system used on both receivers were identical with 400mm square Fresnel lenses of a 330mm focal length. Relative Humidity was stable at 73%.

TEST RESULTS

These tests were conducted on the evening of 4 September from 1227 to 1255 UTC between VK7MO and VK7TW.

122700	14	-9	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	KA7OEI Preamp Gain On
122900	18	-9	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	
123100	16	-8	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
123300	14	-9	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	
123500	19	-8	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
123700	15	-10	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
123900	0	-31	4.0	3	2					Preamp Changeover
124100	8	-21	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	VK7MJ Preamp
124300	3	-22	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	
124500	3	-24	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	Receiver Relocation
124700	5	-21	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
124900	8	-21	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	
125100	6	-21	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
125300	6	-21	-0.1	0	3	*	VK7TW VK7MO QE37	1	10	
125500	10	-21	-0.2	0	3	*	VK7TW VK7MO QE37	1	10	

The third column represents the signal level and the results are annotated in the last column. The anomalous result at 123900 was due to preamp changeover and the low result at 124500 was due to the movement of the receiver to ensure the visual path of the receiver was not being impaired by surrounding material. The results from 124700 to 125500 are comparable and show that the KA7OEI circuit gives a 12 or 13 dB improvement. It should be noted that WSJT starts to saturate and thus under-estimates signal levels when they are stronger than -10 dB so it is possible that the improvement is in fact slightly greater.

VARIATION WITH RELATIVE HUMIDITY

The results with the VK7MJ circuit of -21 dB with the 400x400 mm lens at elevation 35 degrees and 73% Relative Humidity compare with our results 1 September where the Mirror Lens with the VK7MJ circuit gave around -16 dB at 35 degrees with around 60% relative Humidity. As the mirror lens has around 4 dB advantage compared to the 400x400 mm Fresnel Lens this would imply no variation due to relative humidity. However the change of equipment may well be masking any variation with Relative Humidity so we need to conduct more extensive tests with a fixed equipment set-up.

CONCLUSION

The KA7OEI circuit gave at least an additional 12dB performance.