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Reducing effects of cross talk in a Radio Telescope using Walsh modulation

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The signal flow chain of a typical radio telescope receiver consists of various sub-systems viz. feeds, front-end electronics, signal conditioning circuits, signal transportation to central station, baseband conversion circuits, and digital back-end receivers. There are strong possibilities of spurious coupling of signals from one to the other signal chains at various locations. Since a radio telescope is a very sensitive instrument, such cross talk can seriously affect its usefulness and capabilities. A suitable method for reducing the effect of such cross talk is Walsh modulation and demodulation scheme. The suggested scheme utilizes phase modulation of the received signals using ortho-normal patterns at the front-end receiver of the antenna, and demodulating them just before combining the signals from antennas in the digital back-end. It is very important to match and align the modulating and demodulating patterns, else this can lead to loss of coherence of the desired signal. This poster describes the scheme proposed for the upgraded GMRT receivers that are currently under installation. We also present the tests carried out and the results obtained.