EXPERIMENTAL RECEPTION OF THE UOSAT-2 2.4 GHZ BEACON

Matjaz Vidmar, YT3MV (ex YU3UMV)

During the 1987 the UoSAT-2 / OSCAR-11 2.4 GHz beacon was activated on a few occasions, usually on saturdays. In total there were about 10 useful satellite passes over the author's location (JN65TW), each lasting 10 minutes or less. Therefore the efforts were concentrated on signal acquisition, tracking of the doppler shift, signal stregnth, polarization and eventual modulation determination. No attempt was made to demodulate any data eventually transmitted by the beacon.

The equipment used to receive the 2.4 GHz UoSAT transmissions is shown on Fig. 1. Two orthogonally polarized 25 turn helix antennas were tried having a gain of about 16 to 17 dBci each. A low noise preamp was built with a CFY18 0.5 um gate GaAs FET installed in a microstrip circuit etched on glassfiber teflon laminate. The following converter was built with bipolar transistors in a microstrip circuit etched on conventional glassfiber epoxy laminate. The converter supplied various VHF receivers according to the signal strength and/or modulation expected.

The system noise temperature was computed from the measured difference between ground noise and cold sky noise to be around 250 degrees K. The estimated noise sources are: 100 K antenna side and back lobes, 100 K GaAs FET preamp and 50 K influence of the following stages.

UO11 was received on 2.4GHz on all the orbits the beacon was said to be on starting from July 1987 (after the AMSAT-UK colloquium). Reception experiments with a SSB receiver gave the following results (SNR in 3 kHz bandwidth):

ELEVATION	SNR
5 degrees	about 0 dB
30 degrees	10 - 15 dB
90 degrees	20 - 25 dB

The above results show that the EIRP of the satellite in subpoint direction is between 100 and 300 mW. Assuming the TX antenna has a gain of 7 dBci, the TX output power should be between 25 and 75 mW, much less than indicated by the telemetry received at the same time on 145.825, which indicates over 1W of output power according to the equations published in the "UoSAT Spacecraft Data Booklet".

The signal level was found stable both during a single orbit and between different orbits. No deep fading was observed (like on the 70 cm UoSAT beacons) although RHCP sometimes performed better than LHCP at low elevations.

Very low level modulation (or spurious) sidebands were heard during the August 1987 activations (more tha 15 dB down the carrier) and no modulation sidebands could be detected during the November 1987 activation.

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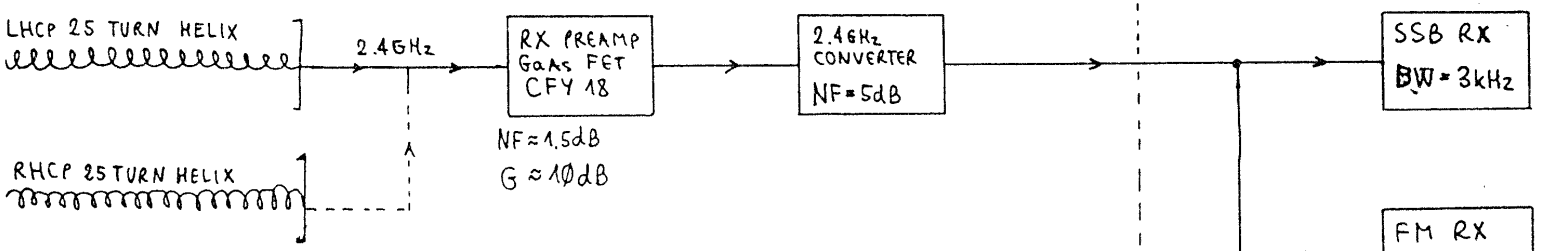

SYSTEM NOISE TEMPERATURE : ~250°K

(MEASURED : SKY NOISE/GROUND NOISE)

ESTIMATED NOISE SOURCES:

ANTENNA SIDELOBES	:	~100° K
PREAMP. GaAs FET	:	~100° K
FOLLOWING STAGES	:	~ 50°K
TOTAL	:	~250°K

OUT DOOR EQUIPMENT

IN DOOR EQUIPMENT

YT3MV

Fig.1-2.4 GHz receiving equipment