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MEX RANGE CALIBRATIONS

The following tables provide typical range calibrations, as were measured during the Mars Express Mission Readiness Tests (MRTs), as a function of the configuration at each of the participating stations. The highlighted first row corresponds to the nominal configuration. The number in parentheses is the number of times a calibration was made.

LPA = Low Power Amplifier;
HPA = High Power Amplifier;
SSA = Solid State Amplifier;
UC = Uplink Converter;

Tables 1 and 2 are for S-band uplink and S-band downlink (S = S-band), relevant for the first 5 days of the LEOP.

Table 1: New Norcia S-band long-loop - values in microseconds

IFMS	SUC	Amplifier	Calibration
1	**1**	**SLPA**	**4.707 - 4.744 (11)**
1	1	SHPA	4.680 - 4.682 (3)
2	2	SLPA	4.722 - 4.733 (4)
2	2	SHPA	4.689 - 4.690 (2)

Table 2: Kourou S-band - values in microseconds

IFMS	SUC	Amplifier	Calibration
1	**1**	**SSSA**	**5.722 - 5.755 (7)**
1	2	SSSA	5.725 (1)
1	1	SHPA	5.792 - 5.793 (2)
1	2	SHPA	5.795 (1)
2	1	SSSA	5.731 - 5.732 (2)
2	2	SSSA	5.730 - 5.733 (4)
2	1	SHPA	5.799 (1)
2	2	SHPA	5.801 (1)

A few calibrations, shown in tables 3 and 4, have been made with X-band up and down-links (X = X-band) and are relevant for the 5th day of the LEOP onwards.

Table 3: New Norcia X-band long-loop - values in microseconds

IFMS	XUC	Amplifier	Calibration
1	**1**	**XLPA**	**4.471 - 4.493 (2)**
2	2	XLPA	4.480 - 4.501 (2)

Table 4: Kourou X-band - values in microseconds

IFMS	XUC	Amplifier	Calibration
1	**1**	**XSSA**	**5.775 (2)**
2	2	XSSA	5.783 (2)

Corrections to calibration values

The range calibration measurements do not precisely provide the difference between the actual range measurements and the desired range measurements, i.e. the distance from the station location (intersection of the antennae axes) to the spacecraft and back again. This is especially true for New Norcia: a constant delay must be subtracted from the measured calibration values to arrive at the final calibrations (that are subtracted from the range measurements in the preprocessing). The constant delay depends slightly on the frequency combination band. In the following the bands are given as U/D, where U is the uplink frequency band and D the downlink frequency band. Note that the corrections are in nanoseconds.

NNO corrections to be **subtracted** from the measured calibrations:-

S/S: 59.47 ns;
S/X: 59.77 ns;
X/S: 59.58 ns;
X/X: 59.87 ns.