

THE AUSTRALIA TELESCOPE NATIONAL FACILITY

Receiver Upgrade for S2 Methanol VLBI Observations at 12.2 GHz

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1. Introduction

This note outlines the proposed upgrade of the existing room temperature 12 GHz receivers so that methanol VLBI observations at 12.2 GHz can be recorded on the new S2 recorders. These receivers are an interim solution until mid 1996 when the first cooled 12-25 GHz receivers should be installed at Narrabri and Mopra.

A block diagram of the current 12.2 GHz system at Mopra is shown in Fig. 1. The VLBI backend is located in the control building.

The system previously used for 12.2 GHz VLBI at Narrabri was similar to that currently used at Mopra, except that the VLBI rack was located in the pedestal of the antenna.

2. Proposed receiver upgrade

To use the S2 recorders, the 12.2 GHz methanol receivers need to be interfaced to the AT conversion system and samplers. We propose to change the frequency of the first local oscillators so that the first IF of the 12.2 GHz methanol receivers will be in the 1300 - 1800 MHz band.

We can not retune either of the present (11400 MHz) first local oscillators in the Narrabri and Mopra receivers so that the first IF will be in the 1300 - 1800 MHz band.

At Mopra we propose to use the 13965 MHz phase locked oscillator from the old Parkes 12 GHz receiver. A block diagram of the proposed 12.2 GHz system at Mopra is shown in Fig. 2.

At Narrabri we propose to purchase a 10800 MHz phase locked oscillator for \$3.5 to \$4.0 K. A block diagram of the proposed 12.2 GHz system at Narrabri is shown in Fig. 3.

- Note that with a 14 GHz first local oscillator at Mopra
- for the same observing frequency, the local oscillator frequencies at Narrabri and Mopra would be different,

- the final IF band at Narrabri will be inverted relative to that at Mopra, but could be (un)inverted digitally
- the block down-converter will be operating at the upper end of its local oscillator frequency range, and
- the first IF at Mopra will be at about 1785 MHz, which is at the upper end of the 1300-1800 MHz input band of the AT conversion system.

The inversion of the final IF band at Narrabri relative to that at Mopra will present a problem until about mid 1995 when the digital phase inversion will be available. To work around this problem, the WILTRON synthesizer could be used as the first local oscillator at Narrabri or Mopra.

If it were decided that the Narrabri and Mopra receivers should be identical, a second 10800 MHz phase locked oscillator could be purchased for the Mopra receiver.

3. 12.2 GHz test tone at Narrabri

Note that we have no test tone at 12.2 GHz at Narrabri as the Test Tone unit has not been completed. It would cost \$4 K to purchase the filter and active doubler required to complete the unit. Completing the Narrabri test tone unit is not essential, but alternatives like tying up the WILTRON synthesizer or cobbling together a filter, amplifier and doubler are not viable in the long term.

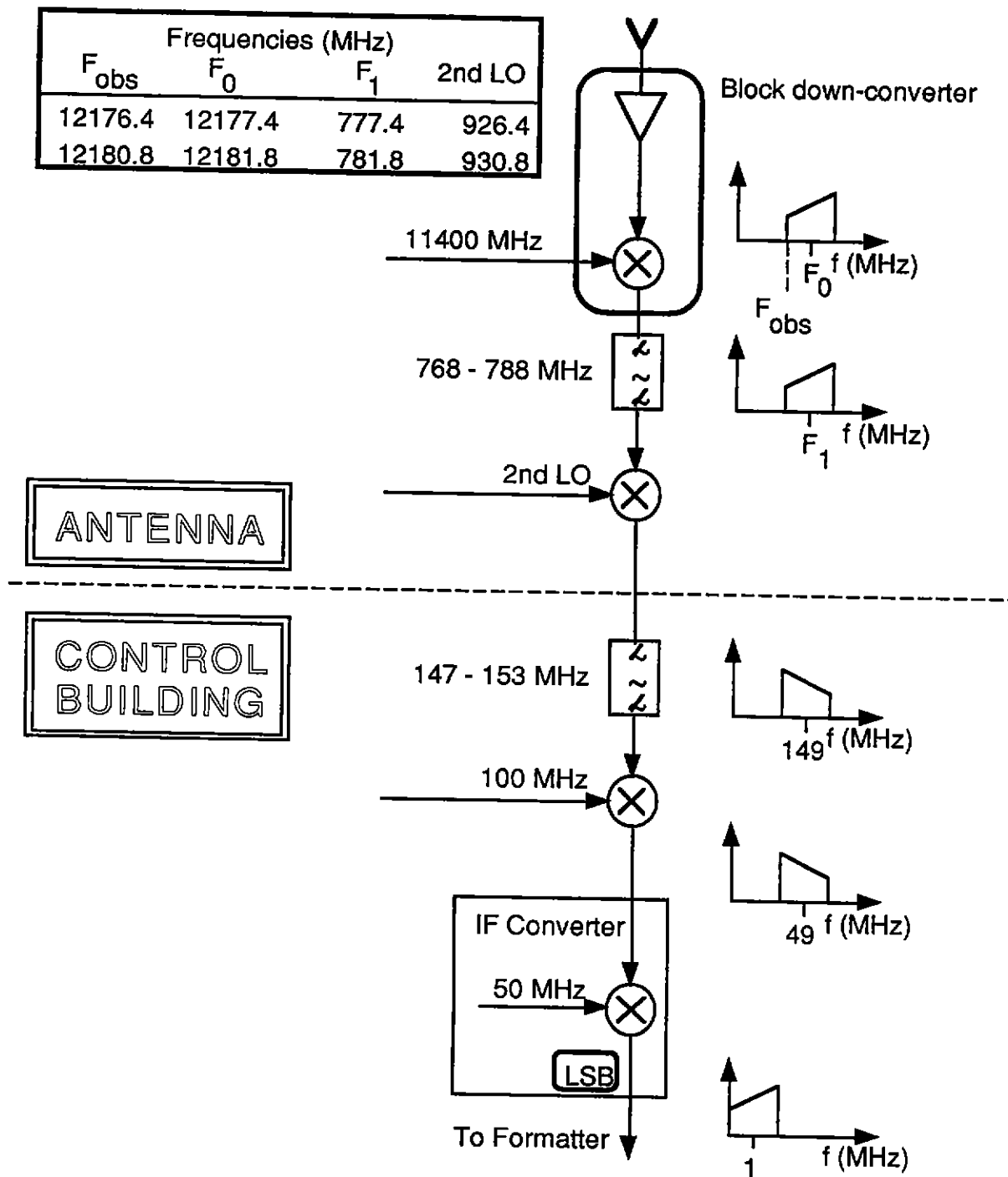


Fig. 1. Block diagram of the current 12.2 GHz system at Mopra.

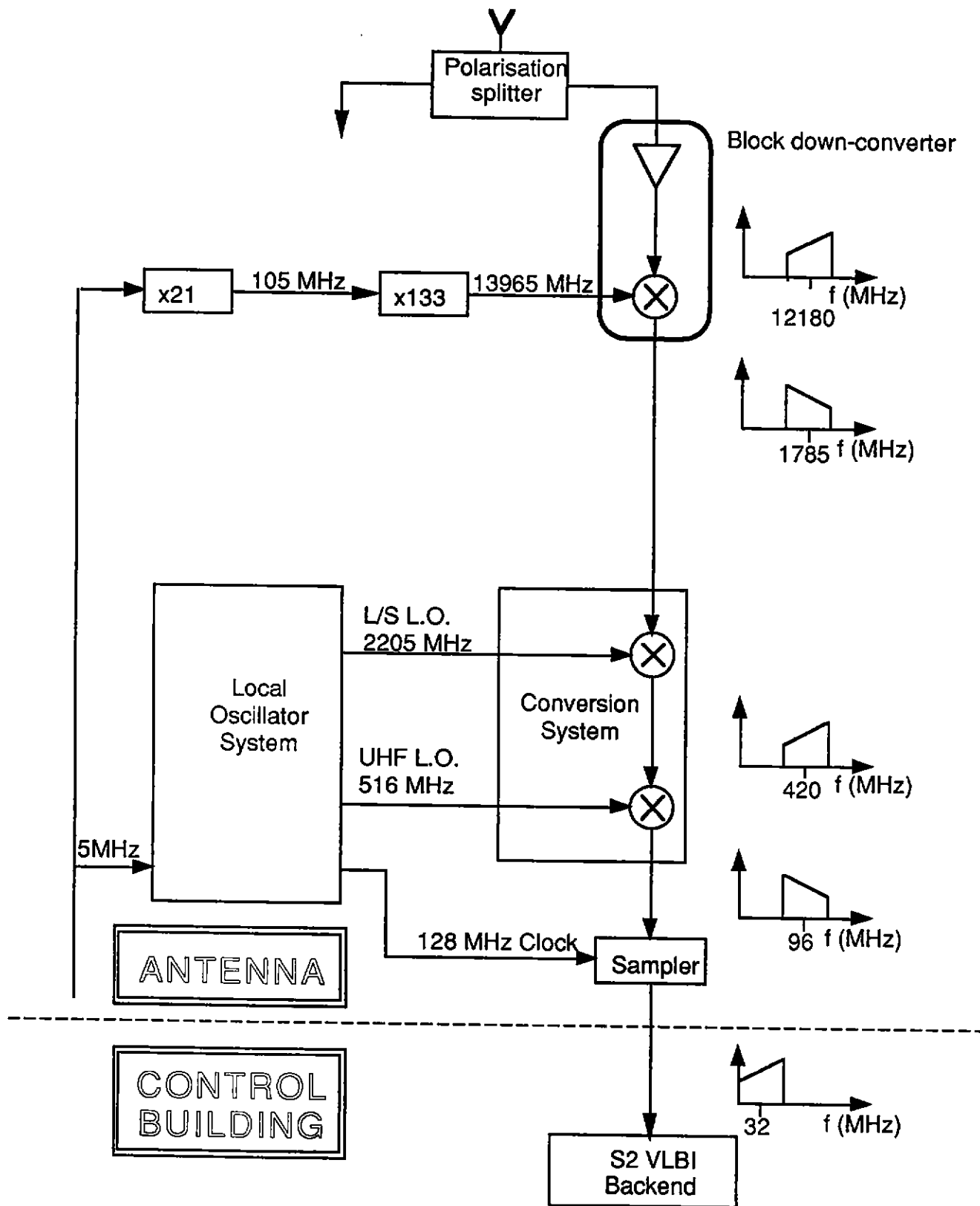


Fig. 2. Block diagram of the proposed 12.2 GHz system at Mopra.

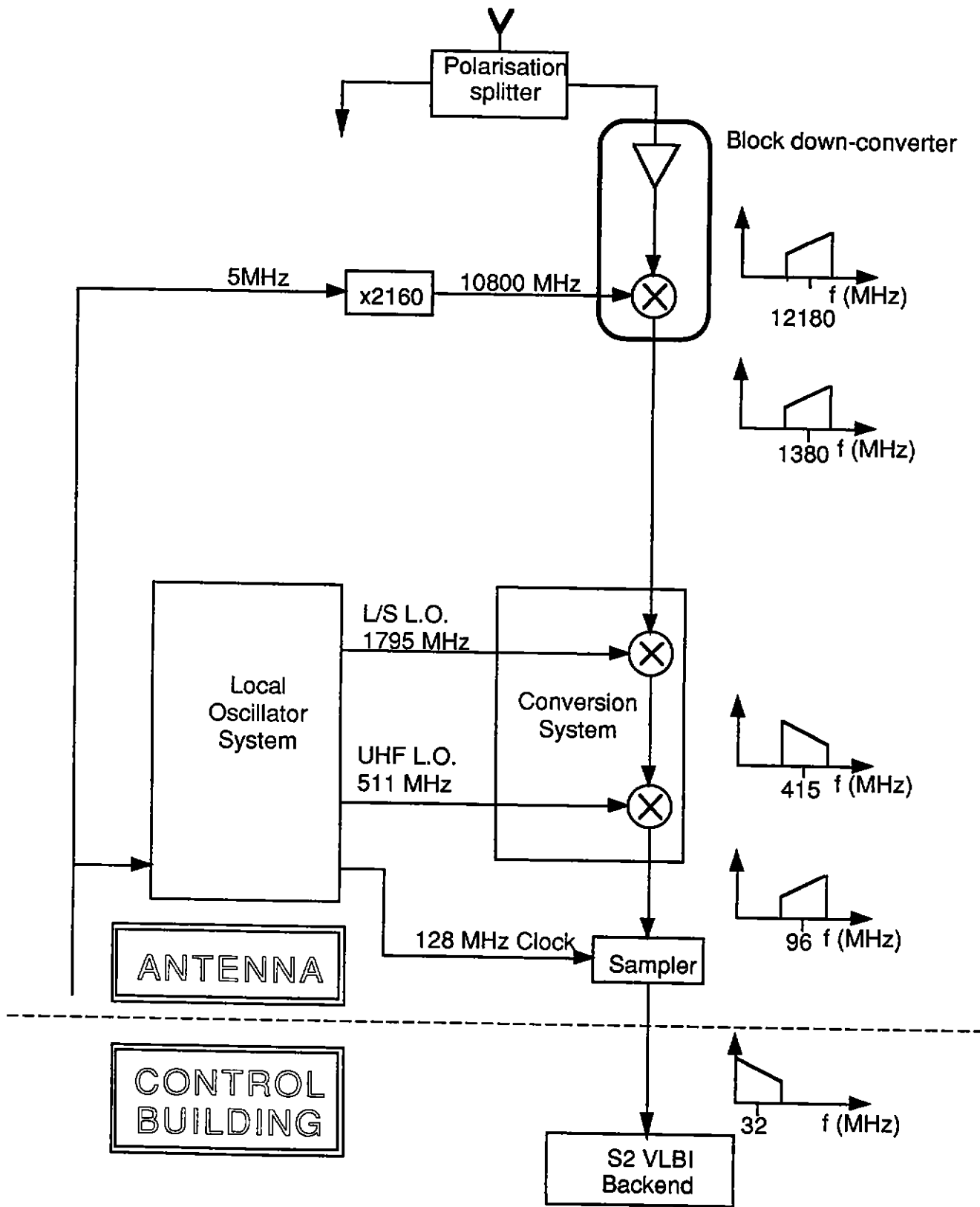


Fig. 3. Block diagram of the proposed 12.2 GHz system at Narrabri.