

**Humidity reduction for  
recording headstack used in  
Noto VLBA terminal.**

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RAPPORTO INTERNO

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## 1. Introduction

The first high density headstack used in Noto has had a life very short. Indeed after about half life in comparison with what was declared by the seller, the bad performances in writing came out. This was surprising and our rough knowledge about the problem suggested to perform in any case the catastrophic observation session in November 1993.

The estimated life was something less than 2000 hours. The Interferometrics was asked for such a short life and the indication was clear: too high relative humidity in the ambient where the recorder is placed. In that period the antenna control room was not controlled in humidity, but only temperature and the possibility to have high values were reality.

The first operation has been to control the full ambient at good human conditions (say 40 - 50 %) and to try to find a way to keep under 40 % near the recorder, as was recommended by Interferometrics people. A possible solution was suggested by the Nitrogen gas already used within receivers in order to keep the vacuum window clean from moisture. The idea was to carry a small flow of the dry  $N_2$  inside the headstack ambient between the tape plate and the transparent window. Of course this zone is not fully closed, but a gas flow can replace the air (and its humidity) inside, entered during the tape change. After a short time (few minutes) the humidity decreases keeping, in our experience, values up to about 20%.

This short report describes the realisation for such a type of solution because several stations asked details and drawings.

## 2. Installation and evaluations.

The fundamental and simple task consists in carry a dry gas as nitrogen or air inside the headstack chamber. Most of the stations have already a source for such gas that is used with receivers. A small plastic tube can transport the gas inside the room where the recorder is placed. Particular attention should be paid in the connections because air inflection is easy consequence for not well realised junctions.

A schematic view is shown in the fig. 1.

In Noto we use a big liquid nitrogen tank and a tube of 10 mm internal diameter is used to bring the gas after a path of about 10 m inside the station in the rear side of the recorder rack. The tube goes inside the rack through the upper side where several holes are used for cooling air flow.

A flow meter with regulation can be used to regulate the flow at about 3 - 4 litres for minute. Under the headstack actually is present a place for a dummy head. In this part a small plate has been placed with a hole to exit the tube carrying nitrogen. This part is very near to the head position, but better solution to insert the gas could to be found.

An indicator showing the relative humidity in the zone of maximum interest was placed, in order to be sure about the presence and the effect of that action. We bought a small humidity/temperature indicator that we fixed near the upper tape position, in any case far from having possibility of mechanical consequences. The humidity sensor was extracted and using two small wires placed near the headstack.

A second identical instrument was placed outside the window in order to compare the difference in relative humidity. The gauges we used in Noto are simple commercial instruments and the reading in the upper and lower range the error is large, but an evidence for the effect is assured.

In fig. 2 is shown a collection of humidity value taken during one day from external instrument (the upper line) and internal one (lower line). It's possible to notice a difference between them of about 15 %.

At this date (May 1995) our headstack is yet pretty young to make previsions, it was used for more than 2000 hours. Degradation is pretty fast and up to now no evidence has been found. Whether relative humidity is a fundamental parameter to reach long headstack life, this will be verified. In any case the suggested conditions were met and the determination of the total life will determine new discussion about the theme.

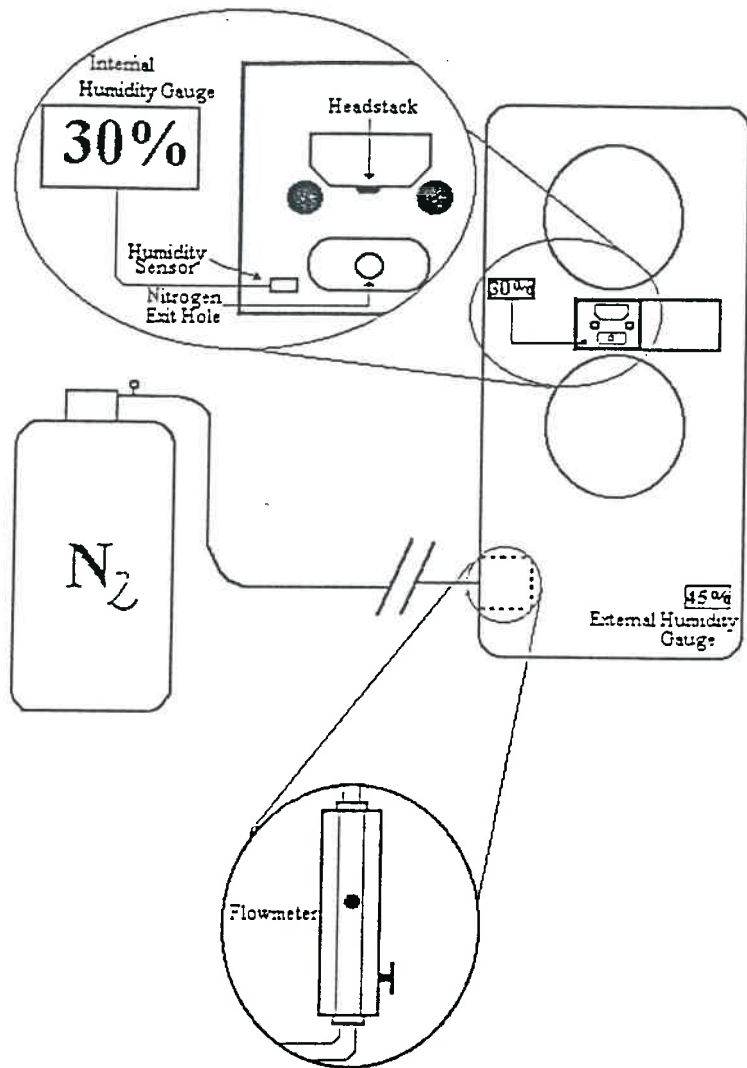


Fig. 1 - Use of Nitrogen gas in Noto VLBA Recorder.

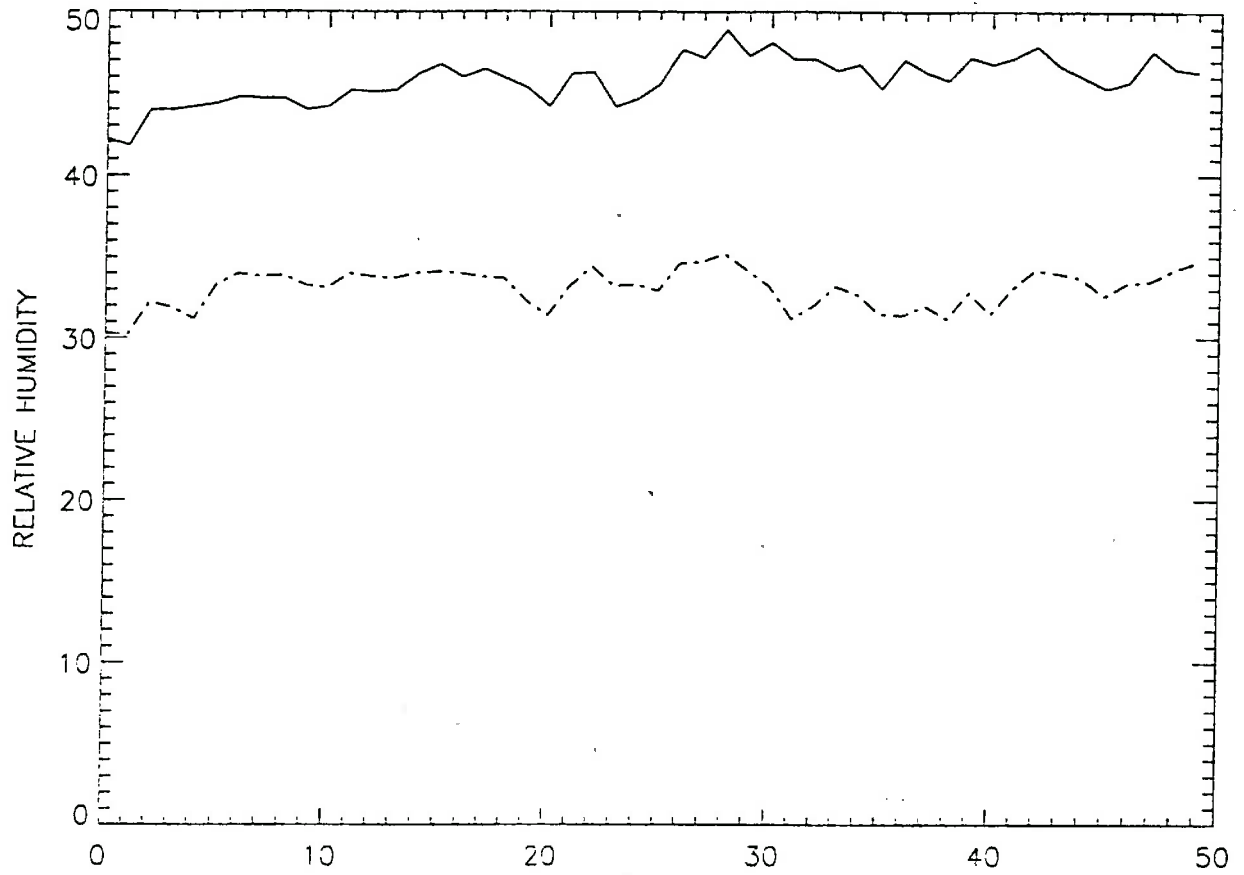


Fig. 2

Upper line shows relative humidity outside recorder, lower line the internal values. Data were taken every 30 minutes during a full day.