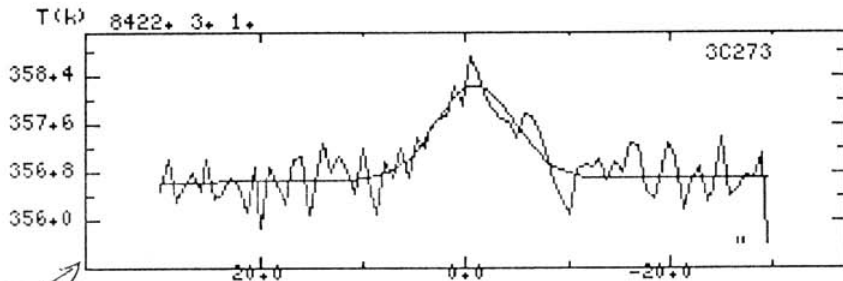


Effelsberg 3mm Receiver performance

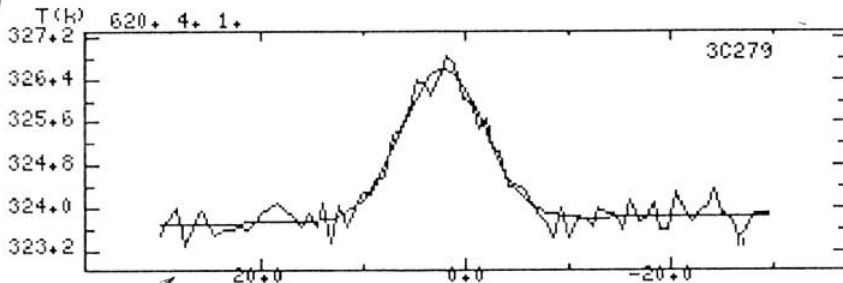
The receiver was used in December 1994 with 'old' horn (small illumination) and in March 1995 with a new horn designed to illuminate at least 80m. It was hoped that this horn would give more gain and a more uniform gain/elevation performance. Noise temperature measured in the lab was about 330K DSB in December and 270K in March. The beamwidth to half-power in 1994 was (el/az) 10.8/10.0" in the elevation range from 13 to 40 degrees. The azimuth beamwidth above 60 degrees becomes very narrow (8"). In 1995 the beam was 10.0/9.2" on average. The calibration signal was useless, since it is variable and only equivalent to about 1-2K in size. In order to calibrate the observations a part of each observation with good weather was chosen. In both cases this corresponded to about 10mm H₂O or a zenith absorption of about 0.12 (These figures from Cernicaro thesis). Adjacent high- and low-elevation scans were compared to make a 'sky-dip'. First-order calibration of the receiver was done in CONT2 using 'CAL1=1 ; TCAL=0.0118 (1994, 0.0074 in 1995). The values obtained were then compared with the sky dip. Antenna temperatures of planets were compared with their flux densities corrected for telescope beam, these were as follows, where a number is given for each epoch (1994/1995): Mars 53/81, Saturn 79/63, 3C273 20/16, 3C279 16/19.

Here is a comparison of 1994/1995 observations of 3C273

3C273 narrowband



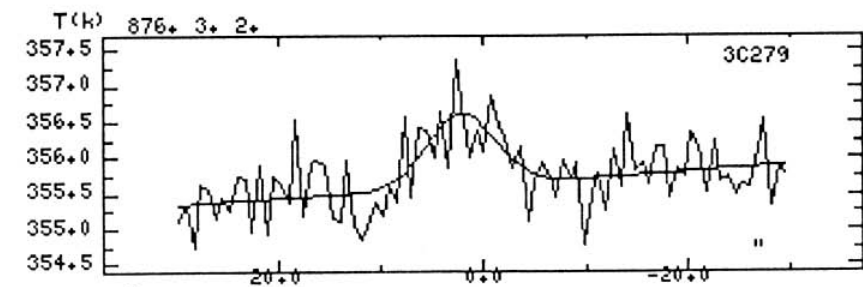
1994 3C279



narrowband 1995

Telescope gain in the elevation range 16-50 degrees was calculated, corrected for atmospheric absorption as 0.07-0.12 K/Jy (1994) and 0.15-0.2 K/Jy (1995), so that the wider illumination brings an improvement of about 1.9. No observations were done at elevations over 51 degrees, so one cannot check the shape of the gain curve.

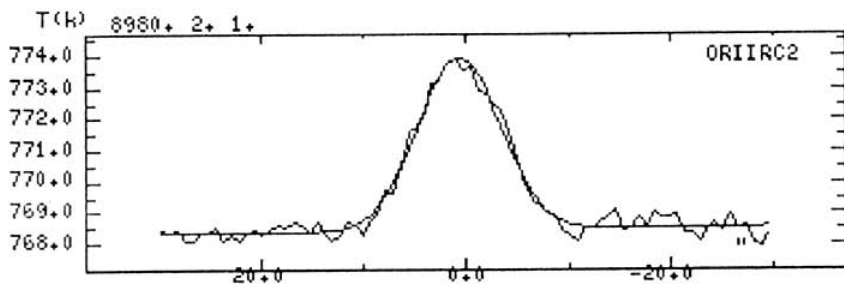
In the broadband channel better results were obtained in the 1994 session, but this channel was kaputt in 1995 and gave very noisy results, possibly the input level to this unit or the output level to the V/F was too low giving quantisation.



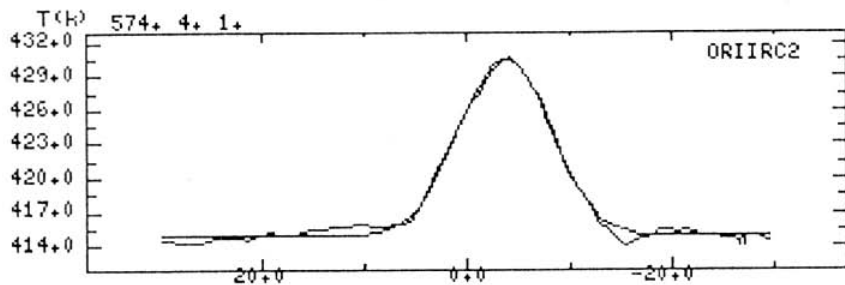
Broadband 1995

(kaputt)

The new horn also allowed line pointing measurements on more sources, here is an example on Orion IRC2 using the SiO line with rest frequency of 86.243GHz.:



IRC2 line 1994



IRC2 line 1995

Note that the zero point and calibration of the line data is not defined, since the line pointing system uses a narrow filter on the line and a broader filter off the line, difference being formed to reduce weather effects so that line pointing can be done in bad weather conditions.

D. Graham Dec 1995