2. On the Inversion Spectrum of Ammonia

Isao Takahashi, Akira Okaya, Tsuneo Hashi,
Toru Ogawa and *Osamu Ryuzan*

(Nozu Laboratory)

The inversion spectrum of ammonia is the first and most thoroughly studied one in the microwave region. It is, however, still an attractive subject from both experimental and theoretical point of view. Recently the new hyperfine structure was discovered by K.E. Good, et al. (P.R. **83**, 880 1951). Therefore, we attempted to observe several inversion lines of $N^{14}H_3$ and to confirm the results peported up to the present.

As a source of 1 cm wave, we used a crystal multiplier driven by a 3 cm klystron 2K25. Our multiplier is different from the one usually used. A crystal 1N26 is placed in the 3 cm wave guide with the tapered guide which is intended to prevent the fundamental and second harmonic power from passing through. With this apparatus the power of the order of 10^{-4}watt was available in the 1cm region, and much benefit was obtained because of its wide frequency response. We employed a crystal video detecting system and the over-all spectrometer sensitivity was about $10^{-6}cm^{-1}$.

The frequency measurement was made with the apparatus which we reported already. Our results of measurement fairly coincided with those published by others. Some of them are shown in the following table.

J	K	W. Good, *et al.* (Mc/s)	M. Strandberg (Mc/s)	this paper (Mc/s)	abs. coeff. ($10^{-6}cm^{-1}$)
1	1	23,694.49±0.02	23,694.48±0.05	23.694.51~23,694.06	140
2	2	23,722.63 ,,	23,722.59 ,,	23,722.59±0.024	320
3	3	23,870.13 ,,	23,870.09 ,,	23,870.10 ,,	720
9	8	23,657.48 ,,	23,657.44 ,,	23,657.43 ,,	58

In our observations, the uncertainty of the line $J=K=1$ was confirmed which, we are sure, corresponds to the hyperfine structure reported by Good, *et al.* But under our experimental conditions, the hyperfine structure was not completely separated because of the line broadening.