HYSPEC MEMO NO. 4

National Radio Astronomy Observatory
Tucson, Arizona

March 3, 1986

MEMORANDUM

TO: S. Weinreb

FROM: D. Hogg

SUBJECT: Hybrid Spectrometer

In response to your questions about the hybrid spectrometer, I spoke with Turner, Wootten, and Jewell, and concluded the following:

1. Maximum signal in a 50 MHz section of the spectrum. The maximum line strength to be expected is that of the CO line in Orion, at 70-80 K. This line is fairly narrow-5 km/s or ~5 MHz at the higher frequencies. There is also a strong "plateau" - 20 km/s and 20 K. Each of these give equivalent line widths of 400 K • MHz. The widest line in the galaxy M82 is 500 km/s at 3 K, for a total of 1500 K • MHz. However, if the width is constrained to 50 MHz, then it is unlikely that the equivalent width will exceed 1000 K • MHz.

2. Dynamic Range. We may have a real problem here. All agree that "sidelobes" of 3 percent are unacceptable, and that a level of 0.1 percent should be the goal. The system is marginally acceptable at perhaps 0.5 percent.

The difference between the applications in Tucson and Green Bank arises because of the richness of the millimeter-wave spectrum, where it is the norm to have many lines in the passband. Thus work on weak lines (detecting, even mapping) must sometimes be done in the presence of strong lines. Note also that a favorite test in detection work, the LO shift, will be useless in the case of sidelobes.

c: B. Turner
A. Wootten
P. Jewell