

Jewell

NATIONAL RADIO ASTRONOMY OBSERVATORY
Charlottesville, Virginia

March 26, 1990

MEMORANDUM:

TO: Addressee

FROM: A. R. Kerr, J. Lamb and J. Payne JP. ARK

SUBJECT: SIS Receivers for the 12-Meter Telescope

Recently several users of the 12-meter telescope have stressed the importance of our providing, as quickly as possible, SIS receivers to cover the 3, 2 and 1 mm atmospheric windows.

This memo is a summary of our plans to provide SIS receivers at the 12-meter telescope.

The 68-115 GHz Band

SIS mixers to cover this entire band have been fabricated and are ready for use. The band will be covered by a receiver using two pairs of mixers, one pair for 68-90 GHz, the other for 90-115 GHz. The mixers will be tunable for single sideband operation in the same manner as the existing 90-115 GHz mixers. Receiver temperatures of < 100 K SSB are anticipated. We are aiming for telescope tests of this receiver in September 1990 with availability for observing soon after this date.

The 130-170 GHz Band

Mixers to cover this band are currently being designed and the receiver components are being purchased. We anticipate that this frequency band will be added to either the 68-115 GHz receiver or the 200-240 GHz receiver by January 1991. Receiver noise temperatures of less than 150 SSB are anticipated.

The 200-240 GHz Band

A receiver for this band is nearing completion in Tucson and will be tested on the 12-meter telescope in March 1990. Receiver temperatures of approximately 200 K SSB are expected. We hope to schedule this receiver for use shortly after the telescope tests.

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The 240-360 GHz Band

Within the next six months, we will start design work on a cryostat to support this band using three pairs of mixers. Quasi-optical LO injection and image termination will be used. The availability of suitable SIS devices for use in this receiver makes the completion date uncertain. It may be that existing devices can be used to give acceptable performance. It is also possible that completely new devices will be needed. The position will become clearer in the next six months as new devices become available and existing devices are tested at higher frequencies.

A Multi-Beam Capability

The 8-beam receiver in use at the 12-m telescope gives a unique mapping capability at 230 GHz. The existing receiver uses Schottky-diode mixers and has been useful for developing the techniques and software needed for multi-beam mapping. This receiver should be converted to SIS now that good SIS mixers are available at 230 GHz. We anticipate that this conversion will be the first step in a new generation of multi-beam SIS receivers.

The conversion is a major task and, in view of the other receiver work planned, it is difficult to see how it can be accomplished before June 1991.

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