

Interoffice

NATIONAL RADIO ASTRONOMY OBSERVATORY
TUCSON, ARIZONA

April 16, 1981

To: addressee
From: John Payne
Subject: 12 M Receiver installation

12 METER MILLIMETER WAVE TELESCOPE
MEMO No. 19

In view of the fragile nature of the proposed new surface for the 12 M antenna, I think it important that we minimize travel over the surface. While it is certainly true that we can install cat walks and work platforms over the surface, experience shows that it is only a matter of time before the surface will be damaged. Over the past several years, I have observed the cherry picker collide with the antenna on about four occasions. While our dish survived, I imagine an Essco surface would have suffered severe damage. With the constant traffic to the receivers, it is almost inevitable that such mishaps will occur.

We have given some thought as to the best way of installing receivers on the new antenna. Since the receiver boxes for the 36' Cassegrain were designed, things have changed quite a lot. The components within the cryogenic enclosure are fewer and simpler. There are no moving parts within the dewar; the LO is injected optically; the mixers have fixed backshorts; the paramps have been replaced by GAS FETS. These changes mean that the time is ripe for a complete redesign of our millimeter wave receivers. Three receivers (covering all the atmospheric windows) may be mounted on the antenna at once. All receivers would be cold and would share a common I.F. processor and control electronics box. A particular receiver may be selected by a rotating mirror. This approach is illustrated in figure 1 and is more detailed in figure 2. It has the following obvious advantages.

- 1) All servicing is done from behind the reflector.
- 2) Receiver changes involve simply the throw of a switch to rotate the mirror.
- 3) The modular construction means that a single module may easily be removed to work on.

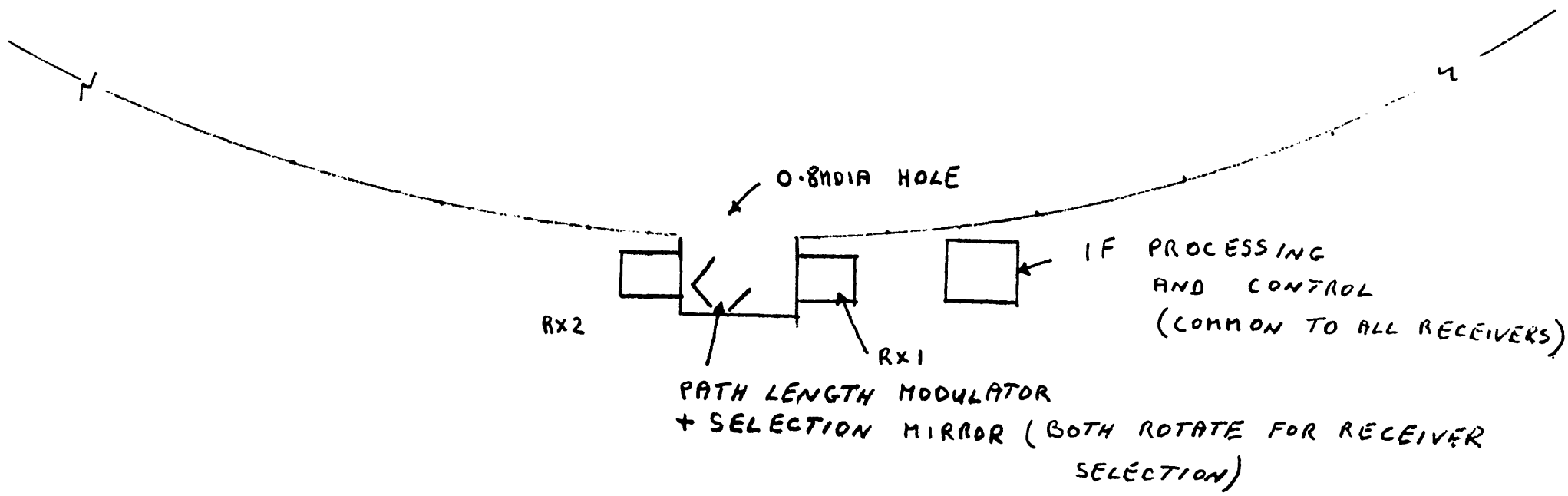
Incorporated in this design is the path length modulator that has proved so helpful in smoothing spectral base lines.

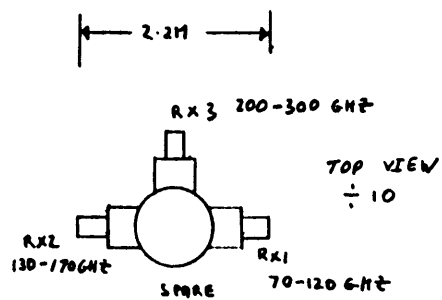
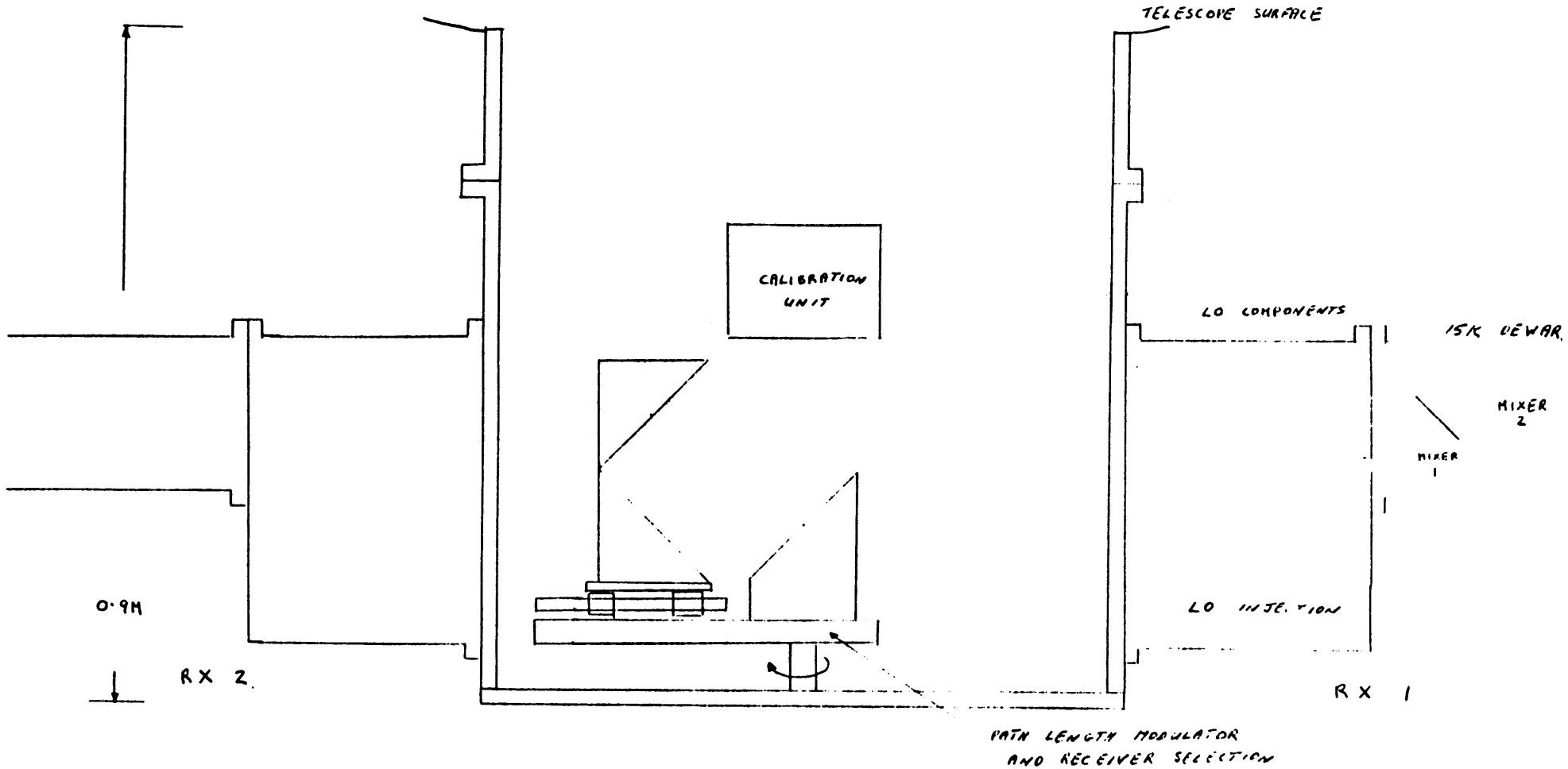
Due to the increased path length to the receiver, we would be able

to keep our existing feeds and subreflector (or a profile very close). The dimensions given are conservative and would probably be increased to 3M X 1M. An alternative would be to move the three receivers further from the center, leaving only the mirror and path length modulator centrally located.

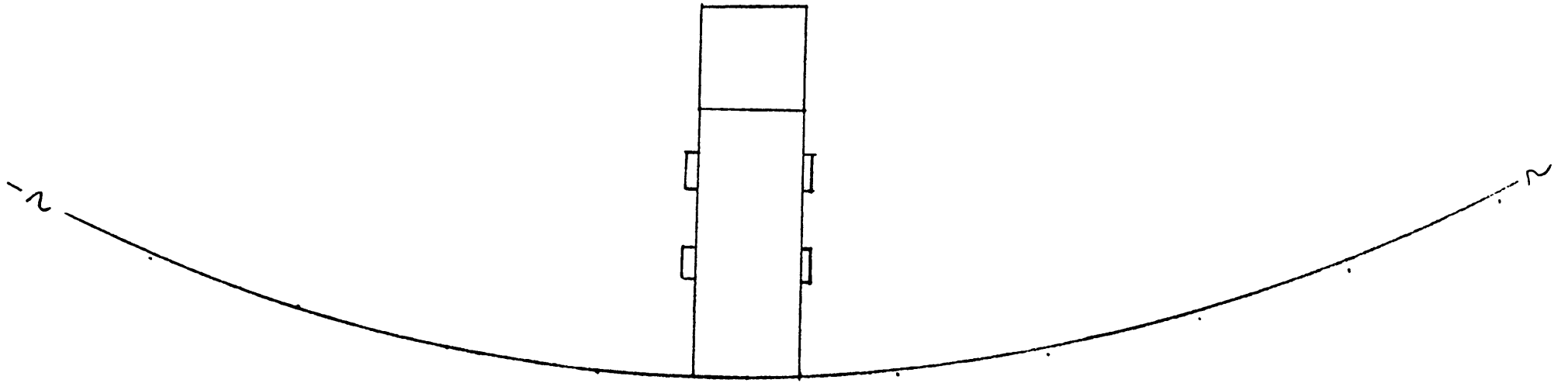
The other alternatives are illustrated in figures 3, 4 and 5. Figure 3 shows an existing receiver mounted on the new surface. The obvious disadvantages are installation and servicing difficulties. Figure 4 shows an existing receiver recessed into the vertex. Servicing is possible but awkward, and installation is still difficult. Figure 5 shows two of our existing receivers mounted under the reflector. Servicing would probably be O.K. but probably installation would be difficult.

We will discuss all these possibilities with Bill Horne when he comes to Tucson.





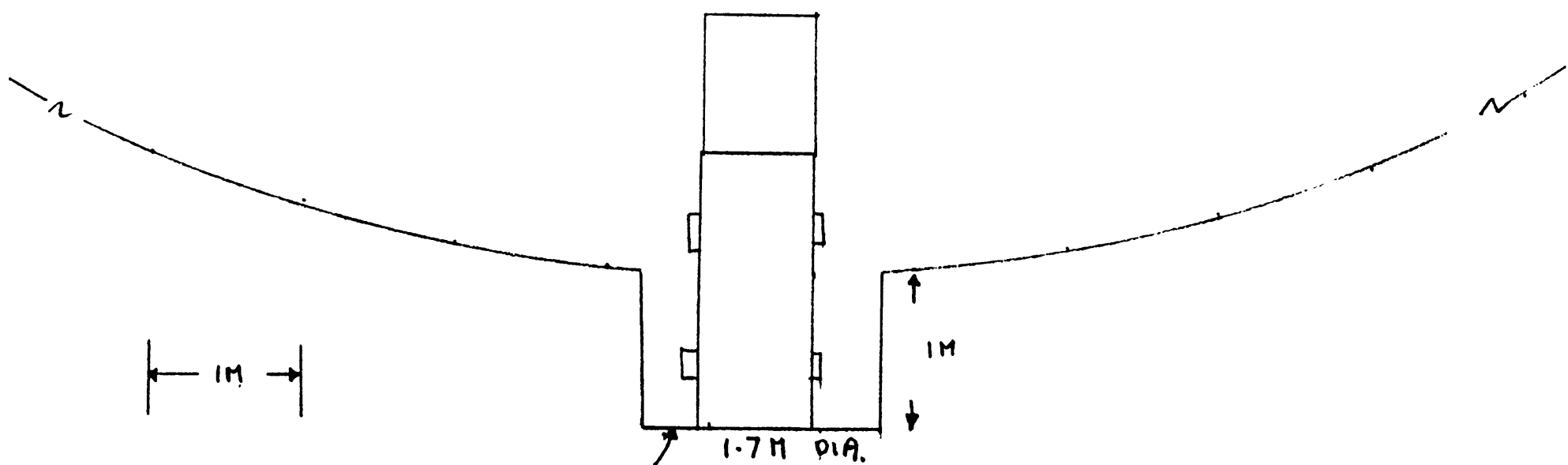
F



1 m

3

.F



1.7M DIA.
MOUNTING + SERVICE
PLATFORM ACCESSABLE FROM
BEHIND REFLECTOR

4

.F

