

National Radio Astronomy Observatory

Very Large Array

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To: H. Hvatum, G.M. Peery, C. Bignell

From: W.G. Horne

Subject: VLBA Control Building and Service Facilities

REF: Memos 191 and 201

Memo 191 covered facilities to be provided at the Control Building or Operations center while my Memo 201 referred to the additional facilities which are required somewhere to support the VLBA operation. In this memo I hope to address some related subjects such as ;

- I. Some features of the impact on operations of the relative locations of the Operations Center and the service center or centers.
 - II. Impact on manpower requirements of the relative locations of the Operations Center and Service Centers.
 - III. Some comments on the service manpower estimates set forth in the VLBA report of May 1982.
- I. Operational Impact of the locations of the Operations Center and the Service Center/Centers.

The Operations Center and the Service Centers are inter-related in their relative location in that some of the support activities of the service centers would be more conveniently and efficiently coordinated if the operations center and the service center were at the same general location. Service areas where this particularly applies are;

- (A) Electronics performance monitoring and servicing. Malfunctions will be detected primarily at the operations center. If electronics engineers/technicians are available at the operations center to diagnose the malfunction then the service center personnel (engineers/technicians) can determine the corrective action, the availability of required modules or parts and the time and difficulty of corrective action. If the Operations Center, Service Center and Observing site are 3 different locations in 3 different time zones coordination becomes somewhat

more difficult than for 2 time zones. Warehousing or storage of spare parts, modules, replacement systems would certainly be more convenient if the Operations Center and Service Center were contiguous.

(B) Servo monitoring and repair.

Servo engineers and technicians should have access to a monitor terminal connected to the operations center and hence to the operating site to more adequately detect and evaluate malfunctions. Certainly their terminal at the service center could be remotely located from the operations center as could the spare parts storage but again coordination of corrective action might be improved by a reduction in number of locations involved.

(C) Cryogenic and Air Conditioning Servicing.

Some comments as for Servo monitoring and repair.

(D) Structural and Mechanical Repair and Servicing.

Structural and mechanical repair does not require the close coordination and monitoring through the operations center as the previous activities. More important are the spare parts storage, fabricating facilities available, equipment and tools available and the extent and expertise of the manpower available. Of particular importance is the fact that when this type of work is required it is unlikely that the personnel at the observing site will have either the manpower, expertise, parts, tools or inclination to perform the necessary repairs or modifications. A rather extensive support facility is required for this type of work even though its frequency is limited.

II. Manpower impact of locations of the Operation Center and Service Center/Centers.

Since both availability of Manpower and Travel time for the more involved or serious malfunctions, breakdowns, repairs or alterations are involved I think an analysis needs to be made of about 4 different assumptions:

- (1) One service center located at the operations center with the operations center located not at any existing location.
- (2) Two service centers, one located at the operations center the other located on the other side of the continent (but neither at Green Bank or VLA site)
- (3) Two service centers both separated ~~from~~ the operations center; one located at Green Bank, one located at VLA site.

- (4) Two service centers; one located at the operations center which is located at an existing site (Green Bank/Charlottesville or VLA) and the other service center located at the remaining existing location.

Point of the above operation is to achieve a realistic evaluation of the facilities and man hours/manpower required to support VLBA and then if it is planned to support VLBA with existing groups to evaluate the impact of the added requirements on existing groups.

III. Comments on Manpower estimates in VLBA report -

I think Fig VI - I on page VI - 3 of the VLBA report of May 1982 is underestimated in the maintenance and repair portion of the manpower estimate and may be in the operating portion. Note that operations center is estimated on the basis of 360 days/year. and 3 shifts per day but that only 2 people are provided at each site which will only allow for one shift coverage (stretching even then)

In the field division section of chart VI-1 note that one cryogenic technician is provided for ten operating antennas and, more importantly, for eleven sites. The VLA has 4 cryogenic technicians for 27 antennas and Green Bank has 3. This one man is going to be a very busy man at about the time 4 or 5 antennas have just been placed in operation and are experiencing birth defects and he is in the meantime assembling, installing and testing the remainder of the cryogenic systems. Note also that after array completion this one man will be sent out for failure service; what happens when concurrent service is required elsewhere?

In the area of structural and mechanical services I note that 3 mechanics are listed and assume that these are antenna mechanic types. For any repair of a sizable component a minimum of 3 men are usually required; while we might send only 2 men and utilize the 2 men at the site the qualifications of the 2 men at the site are questionable. The chart on manpower lists these men as Operator/Technicians and if they are telescope operators in the sense of the VLA operators their usefulness as antenna mechanics will be limited.

It appears to me that a portion of Section VI-B is apparently derived from my memo of August 8, 1980 to Hvatum in which I estimated among other things that each site would require service personnel assistance from the service center approximately eight times per year. It should be noted however that this same estimate contained at each

site 5 men to perform shift operational duties and 1 service technician (mechanic) to perform routine maintenance plus minor unscheduled breakdown repair. Section VI-B cuts down the operational staff to 2 men and eliminates the service technician but still retains the estimate of eight trips per year for service personnel from the service center. The qualifications of the site operations personnel is relevant to the duties they perform but I have a strong suspicion that they will lack the expertise, training, tools and inclination to perform many of the maintenance and minor repair jobs such as lubricant changing, pump repair, seal changing and adjustment, brake repair, gear adjustment and minor welding that a mechanic would do. In this case the number of service trips from the service center would undoubtedly increase.

WGH/bmg