AN OBSERVER'S GUIDE TO THE 36-FOOT TELESCOPE

February 1976

National Radio Astronomy Observatory
Tucson Operations
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Tucson, Arizona 85705
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762-6103 FTS

This pamphlet describes Observatory organization, policies, and procedures relevant to your use of the NRAO facilities at Tucson. We welcome suggestions for improving this guide, as well as requests for additional information.

If your name is on the NRAO's list of users, you will periodically receive technical information concerning observing equipment at Tucson. Otherwise, please ask Mrs. Phyllis Jackson (804-937-1225) to add your name to our list.

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I. THE NRAO ORGANIZATION

The NRAO makes its research facilities available, on a competitive basis, to qualified scientists and students without regard to affiliation. It operates radio telescopes at Green Bank, West Virginia, and at Tucson, Arizona.

The NRAO staff will make every effort to provide all possible assistance to observers. Since the Observatory is large and its sites diversified, personal communications may often have to be made by telephone. Telephone directories are available at nearly every office, and observers should not hesitate to contact anyone about a problem or need. Individuals in the following list may be particularly useful in dealing with problems involving the 36-foot telescope.

D.E. Hogg, Associate Director - responsible for general proportions of telescope time and operations.

M.A. Gordon, Assistant Director for Tucson Operations - administers all NRAO activity in Tucson, schedules the 36-foot telescope.

S. Weinreb. Division Head, Electronics - responsible for design and maintenance of all NRAO electronics.

J.M. Payne, Associate Division Head, Electronics - responsible for electronics support of Tucson Operations.

B.L. Ulich, Head, Telescope Operations, Tucson - advises astronomers as to most effective use of the 36-foot telescope and data-collection system to effect their observing proposals.

J.M. Hollis, Programmer - writes and maintains software for the data-collection system of the 36-foot telescope.

W.D. Gust, Administrative Aide, assigns vehicles to observers.

M. Thomas, Secretary - coordinates visitor arrivals.

Telephone numbers at the principal NRAO sites are:

	FTS	COMMERCIAL
Charlottesville	937-1271	(804) 296-0211
Green Bank	924-6011	(304) 456-2011
Tucson Office	762-6103	(602) 882-8250
Tucson, 36-ft site		(602) 623-3982

II. POLICY AND PROCEDURE AT TUCSON

A. Program Responsibility:

The principal investigator(s) will have the responsibility for proper supervision of all aspects of his observing program. The NRAO staff is too small to assume responsibility for any aspect of visitors' programs; its obligation is necessarily limited to supplying a working telescope system, telescope operators, and adequate information on how to use our observing equipment.

Experience has shown that even highly trained observers require some time to become familiar with NRAO equipment procedures. Observers should, therefore, plan to spend a day at the observing site immediately prior to the start of their observing period. Prior to arrival, visitors should keep the Tucson staff fully up-to-date on their hardware and software requirements, either by mail or by telephone; the status of the 36-foot receivers, in particular, is prone to vary on short notice.

The principal investigator on each observing program is responsible for obtaining all calibrations and other receiver and telescope parameters in order to ensure that his data can be reduced as a unit, independent of other programs. Observers often cooperate in these determinations and NRAO personnel will provide as much assistance and information as possible, but the responsibility for this must rest with each observer.

Visitors who bring their own packaged front end boxes must arrange for the equipment to arrive at the site at least one week in advance of their observing periods.

Nota bene:
Perhaps more than any other NRAO telescope, the 36-foot telescope uses equipment close to the state-of-the-art, which requires skill to be used successfully. Observers must prepare themselves by thoroughly reading our literature on the computer and the appropriate receiver and, if possible, arrive early to talk with our engineering staff. Experience has shown such preparation to be essential to successful use of our mm-wave facility.

B. Residence:

The NRAO requires the principal investigator(s) to be at the observing site to supervise the program during at least one-half of the observing period. For this purpose, we maintain 7 rooms in trailers near the 36-foot telescope. Our secretary, Maxine Thomas, will allocate these at your request. While NRAO will supply clean towels and linen, visitors should plan on making and stripping their own beds. Accommodations in the city of Tucson are the responsibility of the observer. But,Maxine

can obtain rooms at special rates at the Holiday Inn adjoining our Tucson offices.

As at all NRAO facilities, spouses are welcome. The necessity for maintaining quiet in the vicinity of the dormitory generally precludes children using these facilities, however.

C. Meals:

Visitors using the 36-foot telescope are welcome to use the cafeteria operated on the mountain by Kitt Peak National Observatory. Unlike that at Green Bank, this cafeteria is open for breakfast, lunch, dinner, and "midnight lunch" at fixed hours only. A current schedule of meal hours is posted in the control room of the 36-foot telescope and in the trailers. Children may not use the KPNO cafeteria.

The observing site is located approximately 2 miles from the KPNO cafeteria. Therefore, the NRAO maintains a General Services Administration (GSA) car for use by observers. To drive it, you must have a valid United States Government license, which Maxine Thomas can issue in Tucson.

D. Travel to and from the Mountain:

The observing site on Kitt Peak is 55 miles from downtown Tucson. Transportation to and from the site is supplied either by the KPNO car pool or in one of our vehicles. Owing to energy shortage, we assign only one car to an observing team. Bill Gust assigns these vehicles.

E. Charges for Room and Board:

Before leaving, you can pay for all meals and lodging at our Tucson offices. Otherwise we shall send you a bill.

F. Alcoholic beverages:

Kitt Peak is located within the Papago Indian Reservation and is under the jurisdiction of regulations set by the tribal council. They prohibit the sale or consumption of alcoholic beverages within the Reservation, and hence on Kitt Peak.

G. Telephones:

While on the mountain, you are welcome to use either the Commercial or Federal Telephone Service (FTS) system. FTS may only be used for business calls. Because commercial calls are billed to the NRAO through KPNO, we ask you to keep a record of your outgoing calls on the pad near each telephone and, also, whether they're for business or personal use.

H. Observer's Comment Sheets:

At the close of your observing, we ask that you fill in a form advising us as to the operational success of your observing. This report helps us improve our service. It is not normally kept confidential.

III. A. Propriety:

Each observer is scheduled on the 36-foot telescope with the understanding that he is to pursue only the program described in his observing request. We have many observers from many institutions working on related programs; to avoid conflicts we require that any observer wishing to change his program should obtain specific approval from M.A. Gordon (or if unavailable, from D.E. Hogg) prior to his observing time.

B. Obligation of Telescope Operators:

The telescope operators have the responsibility for the safe operation of the telescope. A telescope operator is on duty 24 hours each day. In addition to carrying out the observing instructions of the visitor, they decide when to stow the telescope in the event of weather of equipment malfunction. They know whom to call in the event of equipment failure.

C. Scheduling:

Once the NRAO has granted time for any part of an observing proposal, the proposal is removed from active status. Observers may resubmit written requests for continuation of any program after their observing run has been completed. Requests for continuation may also be sent to external referees. If observers wish to optimize the published schedule by trading time on the telescope after they are on site, the Observatory has no objections as long as:

a. The time traded amounts to no more than a few hours.
b. The observers affected by the change agree to the change.
c. The telescope operator is informed of the change.
d. Installation or maintenance time is not affected.
e. No time-consuming changes are needed in the front ends, receivers, computers, etc.

If any of these conditions is not met, contact M.A. Gordon (Tucson), who will try to coordinate the change. Time trades must still be used only for approved observing programs. If more than a few hours are involved, it may necessitate a change in the published schedule.

IV. PUBLICATION OF RESULTS

A. Publication Obligation:

The results obtained by NRAO staff and visitors are expected to appear

in publication. Observers are urged to analyze their data and to publish their results with minimum delay. The accumulation of masses of unpublished data may be a detrimental factor in future considerations of requests for observing time.

B. The NRAO Reprint Series:

We request the privilege of including visitor publications (except abstracts) in our reprint series whenever a significant portion of the work was done, or observational material taken, at the NRAO. We will pay one-half the page charges and, if requested, can supply 50 free reprints to the authors.

The specific procedure to be followed is:

1. At the time of submission, the author should advise our librarian Sarah Martin in Charlottesville as to:

   a. Authors of the paper.
   b. Title of the paper.
   c. Journal to which paper is submitted.

2. We request three prepublication copies of the paper: one for the Director's Office, two for the main library.
   The Observatory does not referee visitors' publications prior to submittal.

3. The author should include a footnote in the text where the Observatory is first mentioned in his paper:

   "The National Radio Astronomy Observatory
   is operated by Associated Universities, Inc.
   under contract with the National Science Foundation."

4. The author should ask the journal to bill one-half of page charges to the NRAO.

5. The author should send a copy of the journal's request for reprints and the approximate number of reprint pages to our librarian in Charlottesville. The NRAO will order reprints separately.

6. All other scientific and administrative communications should be kept between the authors and the journals.

V. $75 DEDUCTIBLE TRAVEL POLICY

The NRAO will pay for part of the round-trip travel to any NRAO radio telescope for those visitor-users whose travel originates within one of the United States or Puerto Rico. For travel to Tucson, the NRAO

will pay the round-trip air fare at tourist rate, or the equivalent, in excess of $75, from the nearest commercial airport to Tucson and return, provided transportation is not otherwise provided by the Observatory. This policy is limited to persons affiliated with U.S. institutions, to one round-trip per person for each observing session and, as a guide, will generally be limited to one or two persons per observing session. A travel authorization-voucher form will be provided upon request to M.A. Gordon, and the observer should send it, together with the original air ticket stub, to the Fiscal Division in Green Bank. The reimbursement will be made payable to the visitor's institution and will be accompanied by a form that can be used by the visitor to recover the remaining travel cost from his home institution. Visitors should expect to pay for all lodging and meals connected with the visit.

VI. MAP

NATIONAL RADIO ASTRONOMY OBSERVATORY

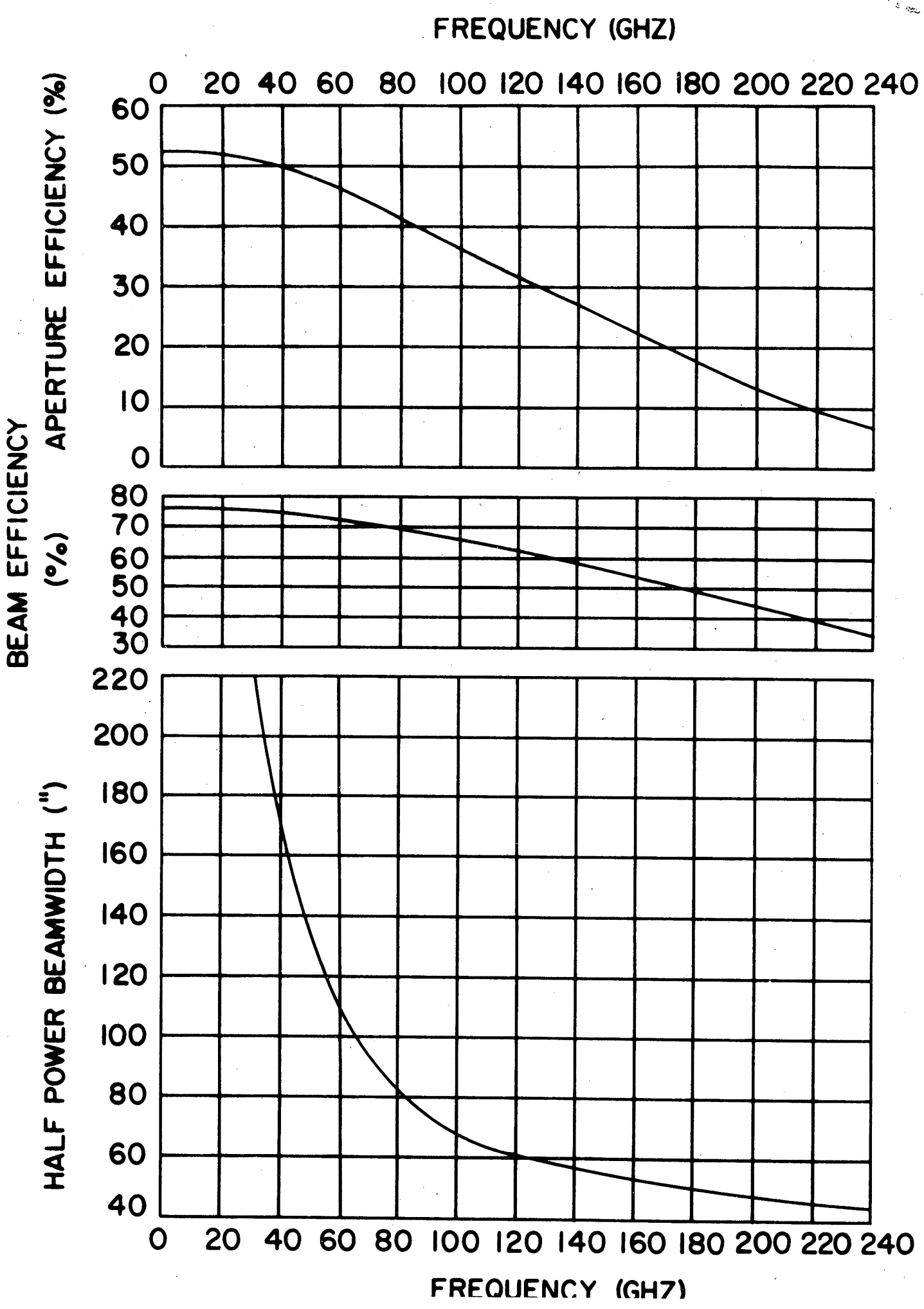
Charlottesville, Virginia

Technical Data Sheet No. 6 February 1974

36 FOOT TELESCOPE

Diameter	36 ft (10.973 m)
F/D	0.8
Elevation	6280 ft (1914 m)
Latitude	31^{o} 57' 12.10" N
Longitude	7^{h} 26^{m} 27.408^{s} W
Mounting	Azimuth-Elevation
Elevation Coverage	16^{o} - 90^{o}
Azimuth Coverage	0^{o} - 360^{o}
RMS Surface Accuracy	0.14 mm
RMS Absolute Pointing Accuracy	7"
Slew Rate	25^{o}/Minute (Each Axis)

Axial focusing over an interval of 10 cm and rotation of the front end box are remotely controlled at the operating console. Since the telescope efficiency is degraded by operation in direct sunlight, the dome is normally opened with observations planned so that the dish is in shadow. Observations through the fabric dome are feasible with a reduction in signal strength. A PDP 11/40 computer provides on-line acquisition and reduction of continuum and spectral line data. Any astronomical object can be tracked. The telescope is located on Kitt Peak near Tucson, Arizona.


FREQUENCY (GHZ)
0 20 40 60 80 100 120 140 160 180 200 220 240
APERTURE EFFICIENCY (%)
60
50
40
30
20
10
0
BEAM EFFICIENCY
(%)
80
70
60
50
40
30
HALF POWER BEAMWIDTH (")
220
200
180
160
140
120
100
80
60
40
0 20 40 60 80 100 120 140 160 180 200 220 240
FREQUENCY (GHZ)