Visitor's Guide to the NRAO 12 Meter Telescope

J. G. Mangum

October 20, 1999

National Radio Astronomy Observatory
949 North Cherry Avenue
Tucson, AZ 85721–0655

Telephone, FAX, Email, and Home Page Information:
Downtown Office: 520-882-8250
Telescope: 520-318-8670
Tucson Office FAX: 520-882-7955
Telescope FAX: 520-318-0759
Email: *firstinitial+lastname@nrao.edu*
Home Page: http://www.tuc.nrao.edu/Tucson.html

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1 Technical Information

The NRAO 12 Meter Telescope began as the 36 Foot Telescope, the telescope responsible for the birth of millimeter-wavelength molecular astronomy. During a period of explosive growth in this new area of astronomical research dozens of molecular species known to exist in the interstellar medium were first detected at the 36 Foot. In 1984, the telescope's reflecting surface and surface support structure were replaced and the 36 Foot was re-christened the 12 Meter. Subsequently, the scientific program has evolved from one dominated by observing programs in astrochemistry to one with a broader mix of studies of molecular clouds and Galactic star formation, evolved stars, astrochemistry, and external galaxies. The 12 Meter is the only millimeter-wavelength telescope in the U.S. operated full-time as a national facility. More than 150 visitors make use of the telescope annually. It offers users flexibility and the opportunity to respond quickly to new scientific developments. The Observatory maintains low-noise receiving systems covering all atmospheric windows form 68 GHz to 300 GHz. Operational reliability throughout is emphasized. Flexible spectral line and continuum backends allow the observer to match the instrument to the scientific goals. The development of multi-beam receivers and the new on-the-fly observing technique has inaugurated a new era of high-speed source mapping on angular scales complementary to those of the millimeter-wave interferometers. The telescope control system offers great flexibility, efficiency, and convenience, and provides a proven remote observing capability.

1.1 Present Instrumentation

1.1.1 Telescope

The basic specifications of the 12 Meter Telescope are listed in Table 1.

1.1.2 Receivers

As many as four receivers are mounted simultaneously at offset Cassegrain foci on the telescope. Receiver selection is by means of a rotating central mirror and can be accomplished in minutes. The receivers are configured remotely from the control room with a computer-aided tuning system. The standard receiver system at the 12 Meter consists of a 4 K closed-cycle cryostat containing up to 8 SIS receivers. A complete set of dual-channel SIS receivers is operational over the atmospheric windows from 68 to 300 GHz range. Table 2 indicates current performance.

1.1.3 Spectrometers

The Observatory maintains two spectrometer systems, filter banks and a digital Millimeter Autocorrelator (MAC). Table 3 lists the filter-bank spectrometers which are available, while Table 4 lists the instrumental parameters for the MAC. For the filter bank spectrometers, the multiplexer will provide two spectra with a total number of spectral channels not in excess of 512. Thus, it is always possible to record simultaneously the output of two filter banks. Except for the 30 kHz bank, all of the filter banks have two independent 128 channel sections. You can configure these banks in one of two ways. In the "series" option, the

Table 1: Telescope and Site Characteristics

Site		
	East Longitude:	$-111^\circ\ 36'\ 53.''475$
	North Latitude:	$+31^\circ\ 57'\ 12.''0$
	Elevation:	1914 meters (6280 feet)
Telescope		
	Primary Reflector Diameter:	12.0 meters
	Focal Ratio (f/D)	
	Prime Focus:	0.42
	Cassegrain Focus:	13.8
	Surface Accuracy:	75 μm rms
	Mount:	Elevation over Azimuth
	Slew Rate:	68°/minute
	Pointing Accuracy:	$5''$ rms
	Elevation Limit:	15°
	Enclosure:	Tracking astrodome with movable door
	Aperture Efficiencies:	52% at 70 GHz
		49% at 115 GHz
		32% at 230 GHz
		22% at 300 GHz

two sections are placed end to end in frequency space, *i.e.*, the 256 channels are sequential in frequency. In the "parallel" mode, the two sections are used independently to accept different receiver (polarization) channels. The series mode is appropriate for observations requiring a large bandwidth. The parallel mode is useful for narrow band observations in which two different frequency resolutions are needed.

2 Observing Opportunities and Responsibilities

The NRAO 12 Meter telescope is available, on a competitive basis, to all qualified scientists and students without regard to nationality or institutional affiliation. Financial support, in the form of travel funds and publication fees, is only provided to investigators employed by U.S. institutions. The procedure for submitting proposals to the NRAO and the mechanics of the evaluation and approval of these proposals are outlined below.

Once scheduled on the telescope, the principal investigator has the responsibility for proper supervision of all aspects of the observing program. This means, for example, that each principal investigator is responsible for obtaining all calibrations and other receiver/telescope parameters necessary for the reduction of his data. The NRAO assumes no responsibility in these matters. For this reason it is the policy of the NRAO that the prin-

Table 2: 12m Receiver Characteristics

Receiver[a]	Wavelength Range (mm)	Approximate T_{sys}(SSB)[b] (K)
68–90 GHz SIS	4.4–3.3	170–225
90–116 GHz SIS	3.3–2.6	160–350 @ 115 GHz
130–170 GHz SIS	2.3–1.8	180–400
200–265 GHz SIS[c]	1.5–1.1	400–900
260–300 GHz SIS	1.15–1.0	800–1200
215–245 GHz 8-Beam SIS	1.4–1.3	700

[a]All single-beam receivers have two orthogonal polarization channels.
[b]Receiver temperatures include all receiver optics.
[c]Receiver noise is around 200 K single sideband for most of the band, but increases somewhat at the high-frequency end of the band.

Table 3: 12m Filter Spectrometer Characteristics

Filter Resolution	Channels per Bank	Filter Banks Available
2 MHz	256	2
1 MHz	256	2
500 kHz	256	1
250 kHz	256	1
100 kHz	256	1
30 kHz[a]	128	1

[a]Series option only.

Table 4: Millimeter Autocorrelator (MAC) Configurations

Total Bandwidth	Useable Bandwidth[1]	Channels	$\Delta\nu^2$	Spectral Resolution
(MHz)	(MHz)		(kHz)	(kHz)
2 IF Modes				
800	600*	2048	390.6	781.2
800	600	4096	195.3	390.6
400	300*	4096	97.6	195.3
400	300	8192	48.8	97.6
200	150*	8192	24.4	48.8
200	150	16384	12.2	24.4
100	75*	16384	6.1	12.2
100	75	32768	3.0	6.1
4 IF Modes				
800	600*	1024	781.2	1562.0
800	600	2048	390.6	781.2
400	300*	2048	195.3	390.6
400	300	4096	97.6	195.3
200	150*	4096	48.8	97.6
200	150	8192	24.4	48.8
100	75*	8192	12.2	24.4
100	75	16384	6.1	12.2
8 IF Modes				
800	600*	512	1562.5	3125.0
800	600	1024	781.2	1562.0
400	300*	1024	390.6	781.2
400	300	2048	195.3	390.6
200	150*	2048	97.6	195.3
200	150	4096	48.8	97.6
100	75*	4096	24.4	48.8
100	75	8192	12.2	24.4

[1] The useable bandwidth takes account of the 75% efficiency of the analog filters.

[2] **NOTE:** This is the frequency sampling interval, not the FWHM channel width, for a given channel. The FWHM channel width is 2.0 times this value.

All values in this table refer to each IF.

Modes tagged with a $*$ are produced by dropping the last half of the lags.

cipal investigator, or a collaborator, normally be in residence throughout the observations to supervise the program. We support remote observing in appropriate circumstances; for more information about this, please contact NRAO staff.

Since minor problems with the telescope system can occur which may not necessarily be repaired in time for your observing run, observers are encouraged to consult the "current telescope system status report" link on the NRAO Tucson Home Page before their observing run. This page is updated regularly and contains a listing of current known problems with the telescope system. Additionally, to insure that observers make the best use of their telescope time, we strongly encourage investigators to discuss their observing plans with the Friend of the Telescope before their observing run.

3 Proposals for Observations

Scientific proposals for use of the 12 Meter telescope should be submitted to:

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Director
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, Virginia  22903-2475
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The proposals, no more than three (3) pages in length, should contain a thorough but succinct discussion of the scientific justification for the observations being proposed, as well as a discussion of the sources to be observed, the manner in which the data will be taken, and an estimate of the telescope time needed to carry out the scientific program. A source list containing source identifications and coordinates should be included. For extensive lists (>50 objects), specific criteria defining the observing sample may be substituted. Special needs, instrumentation or software, should also be noted explicitly. A Cover Sheet on which this information can be summarized is appended; it should accompany each proposal. You may also submit 12 Meter proposals by electronic mail using TeX. Instructions and template files are available from the NRAO Home Page (http://www.nrao.edu).

Once received, the proposals are sent to five referees who are established scientists with broad backgrounds and considerable experience in millimeter-wave astronomy. These referees are not affiliated with the NRAO. Each of the proposals are considered individually by the referees who advise the telescope scheduling committee as to whether the scientific merit of the proposal is sufficient for it to be allocated time on the telescope and, if so, with what restrictions. Using the referees' remarks as a guide, the observations are either scheduled or the proposal is returned to the proposer for further consideration or explanation.

Proposal submission deadlines are given in Table 5. Proposals received before the deadline for a trimester, will either be scheduled in that trimester or, if unsuccessful, will again be considered in the subsequent trimester. A proposal unsuccessful in two consecutive trimesters will be dropped from the telescope queue and the proposer notified. Proposals requesting observations in the 1mm band will most likely be scheduled in the winter months due to the more favorable weather conditions for high-frequency observations.

Table 5: Proposal Submission Deadlines

Deadline	Observing Period
January 1	April to mid-July
July 1	mid-September to December 31
October 1	January 1 to March 31

4 Logistics of Observing at the 12 Meter

4.1 The Arizona Organization

Table 4.1 lists the individuals who should be contacted when questions arise in their areas of responsibility. In addition, more general questions or comments pertaining to Observatory-wide activities (scheduling procedures, scientific or instrumentation priorities, inter-site relations), specific criticisms of, or suggestions for, the Arizona Operation may be addressed to the director of the NRAO, Dr. Paul Vanden Bout, located at the Charlottesville, Virginia office.

4.2 Travel

4.2.1 To the NRAO-Tucson Office

It is most convenient for the observer arriving at the Tucson Airport to take the airport limousine to the NRAO office. The limousine, called the "Arizona Stagecoach," departs from a stand located near the lower level exits of the main terminal building. The limousine driver will know the location of Steward Observatory on the University of Arizona campus (949 North Cherry Avenue) and the Kitt Peak National Observatory (950 North Cherry Avenue). Figures 1 and 2 show the route from the airport to the NRAO and NOAO offices and the street map in the vicinity of the NRAO offices. The NRAO offices are located on the 5th floor of the Steward Observatory building directly across Cherry Avenue from the National Optical Astronomy Observatory office and KPNO. Should you arrive after business hours (07:30–16:00) or on a weekend or holiday, you must obtain GSA car keys from the guard at the KPNO building. The guard can be summoned by a phone located to the right of the front entrance.

4.2.2 To Kitt Peak

The 12 Meter telescope on Kitt Peak is 55 miles from the NRAO Tucson office. Figure 3 is a map of southeastern Arizona showing the route from Tucson to Kitt Peak. Observers may travel to and from the mountain with U.S. government GSA cars. The cars, one for each observing team, are available from Bill Hale at the Tucson office. The observer should contact Bill as soon as his/her travel schedule is known to arrange for a vehicle, either by e-mail (gsacar@heineken.tuc.nrao.edu) or telephone (520–882–8250). A current driver's license is required for those driving GSA cars. Federal regulations require that GSA

Employee	Extension	Responsibilities
Darrel Emerson	117	Site Director. General matters of operations policy.
Jeff Mangum	113	Deputy Site Director. Scientific assistance for users.
Simon Radford	125	Scheduling of the telescope.
John Payne	118	Telescope electronics.
Jeff Hagen	114	Control system software.
Tom Folkers	131	Control system software and data archiving.
Bob Garwood	804–296–0235	Unipops analysis software.[a]
Tom Folkers	520–318–8675	Telescope Operations Manager.
Jennifer Neighbours	115	Data tape request forms.
William Hale	121	Arranges transportation to Kitt Peak.
Diane Miller	110	Handles invoicing for meals and lodging.

[a] Bob is located in Charlottesville. He can be contacted by e-mail bgarwood@nrao.edu or by phone. The local staff can help with most analysis questions.

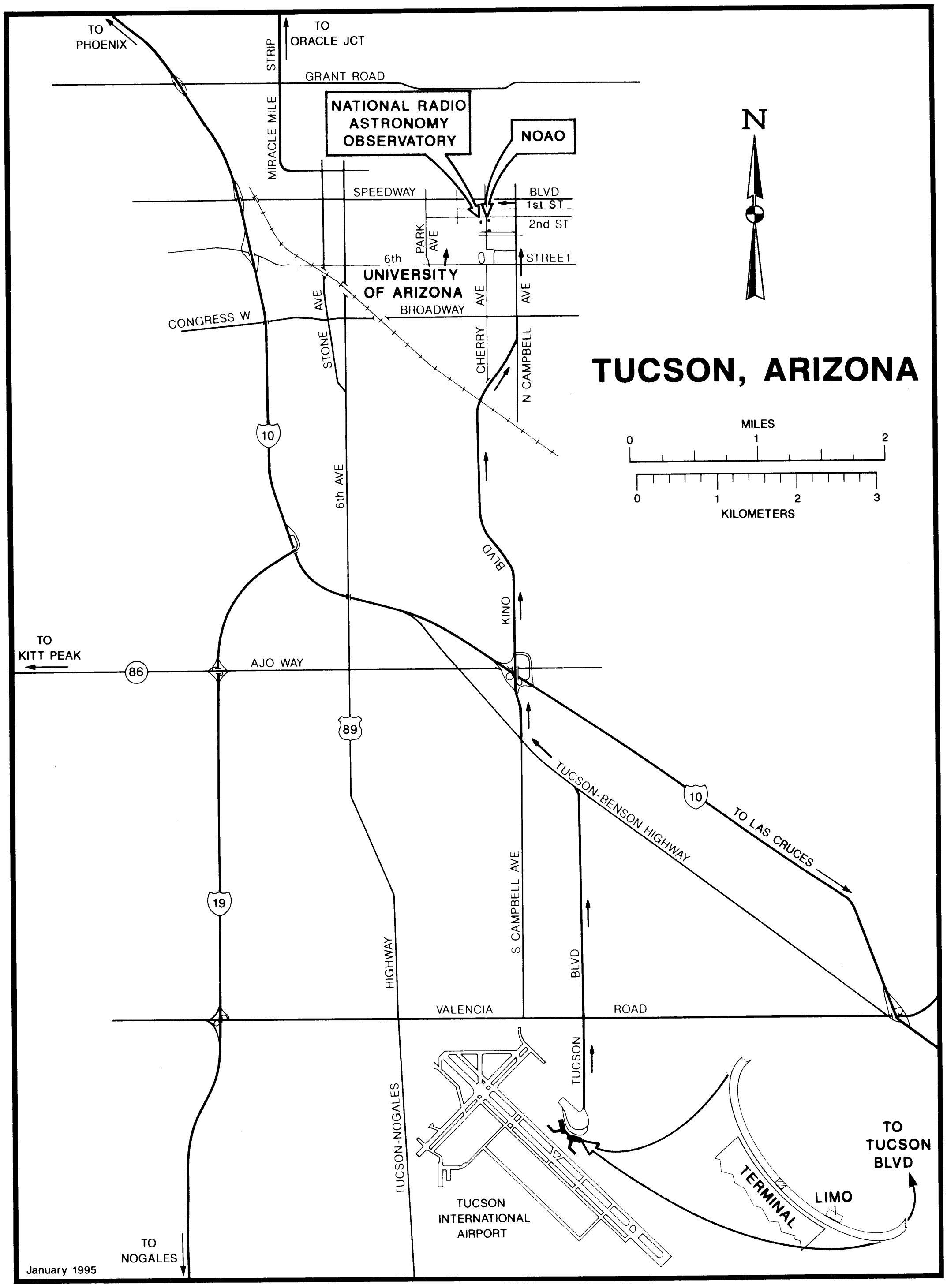

Figure 1: Map of Tucson showing the route from Tucson International Airport to the NRAO downtown offices.

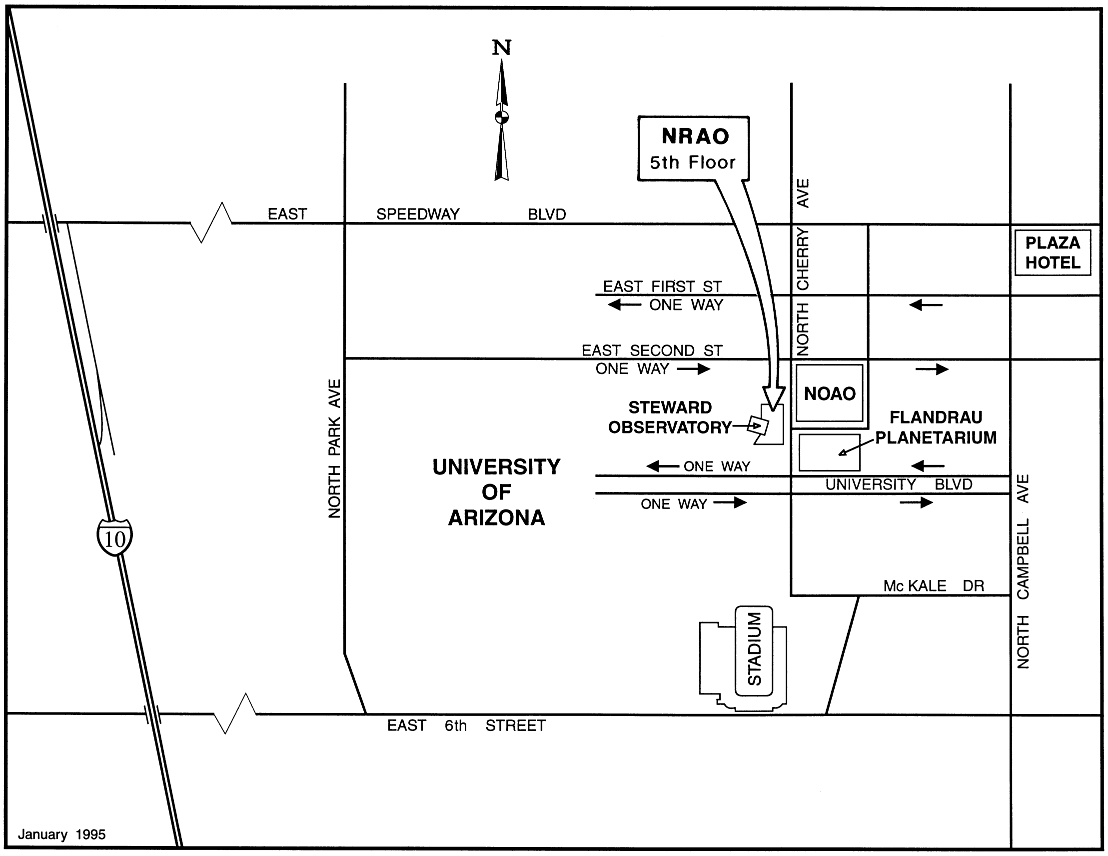

Figure 2: Street map showing the NRAO/NOAO vicinity.

vehicles are to be used for official business only. They must not be driven to local tourist attractions or restaurants. The vehicle is to be returned to the downtown office as soon as the observing run is completed, unless prior arrangements have been approved. The principal investigator should coordinate the return of the vehicle with Bill Hale sometime during the observing run. Please note: When returning the car to the downtown office, please park it near the Steward Observatory **only in a parking slot labeled "State or Service Vehicles"**. Observers are responsible for any parking or moving violations incurred while in possession of a GSA vehicle.
Please note: Observers or their institutions will be responsible for any damages caused by their fault or negligence in the operation of the GSA vehicle. Prior to your arrival in Tucson, please check that your personal or institutional insurance will cover the GSA vehicle while you are using it.

4.3 Housing, Meals, and Laundry Facilities on Kitt Peak

A seven-room dormitory (including one room with disabled access) is adjacent to the 12 Meter telescope. Observers who are listed on the latest telescope schedule are guaranteed a dorm room; no reservations are necessary. However, it is the observer's responsibility to reserve dorm rooms, if available, for any guests which may accompany him. Contact Diane Miller at dmiller@nrao.edu or 520–882–8250 ext. 110. Each room is provided with clean linens and towels. At the end of your visit, please strip the linens from your bed. A lounge/library building provides access to journals, television, refrigerator, and space to relax.

As at all NRAO facilities, spouses are welcome. The necessity for maintaining quiet in the vicinity of the dormitory rooms generally precludes children from using these facilities. Pets are not permitted on the mountain.

Visitors using the 12 Meter telescope are welcome to use the cafeteria on the mountain operated by Kitt Peak National Observatory. Children, however, are not permitted to use the KPNO cafeteria. The cafeteria is located at the summit of Kitt Peak approximately two miles from the 12 Meter telescope. Figure 4 is a map of the facilities on Kitt Peak. Observers usually drive their GSA cars to and from the cafeteria. Meal hours are as follows:

- **Breakfast:** Self-serve breakfast items are available 24 hours per day. Prepared breakfasts are available if requested before 15:00 the previous day (notify the cafeteria manager at extension 686.).
- **Lunch:** 11:30–13:00.
- **Dinner:** 16:00–17:45.
- **Night Lunch:** Self serve night lunch items are available late at night. Prepared night lunches are available, if requested before 15:00 the same day (notify the cafeteria manager at extension 686).

Note: During lunch and dinner hours a cook is present in the cafeteria. There is also a kitchenette in the KPNO dining area, open 24 hours a day, from which observers may

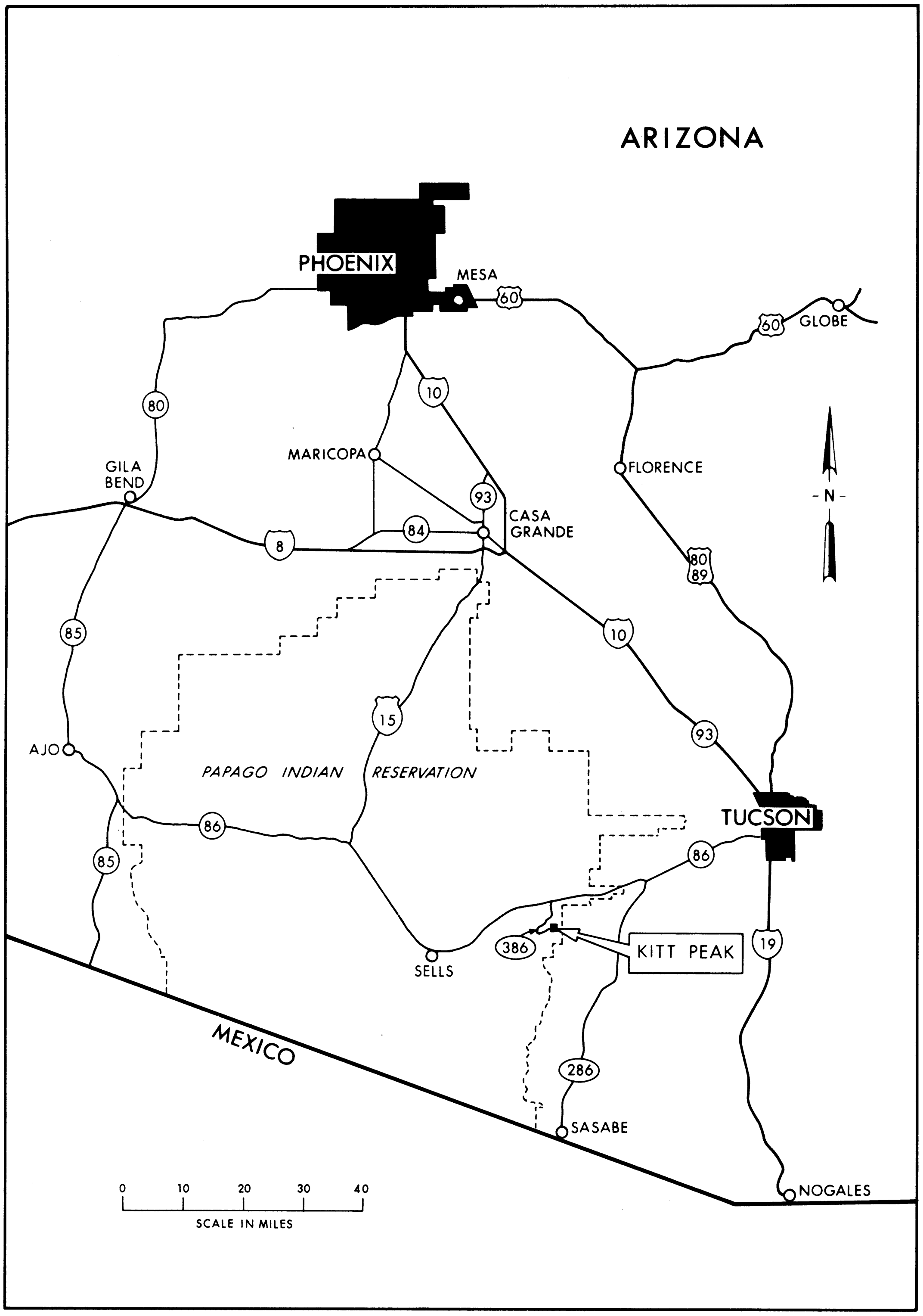

Figure 3: Road map of southeastern Arizona showing the route from Tucson to Kitt Peak.

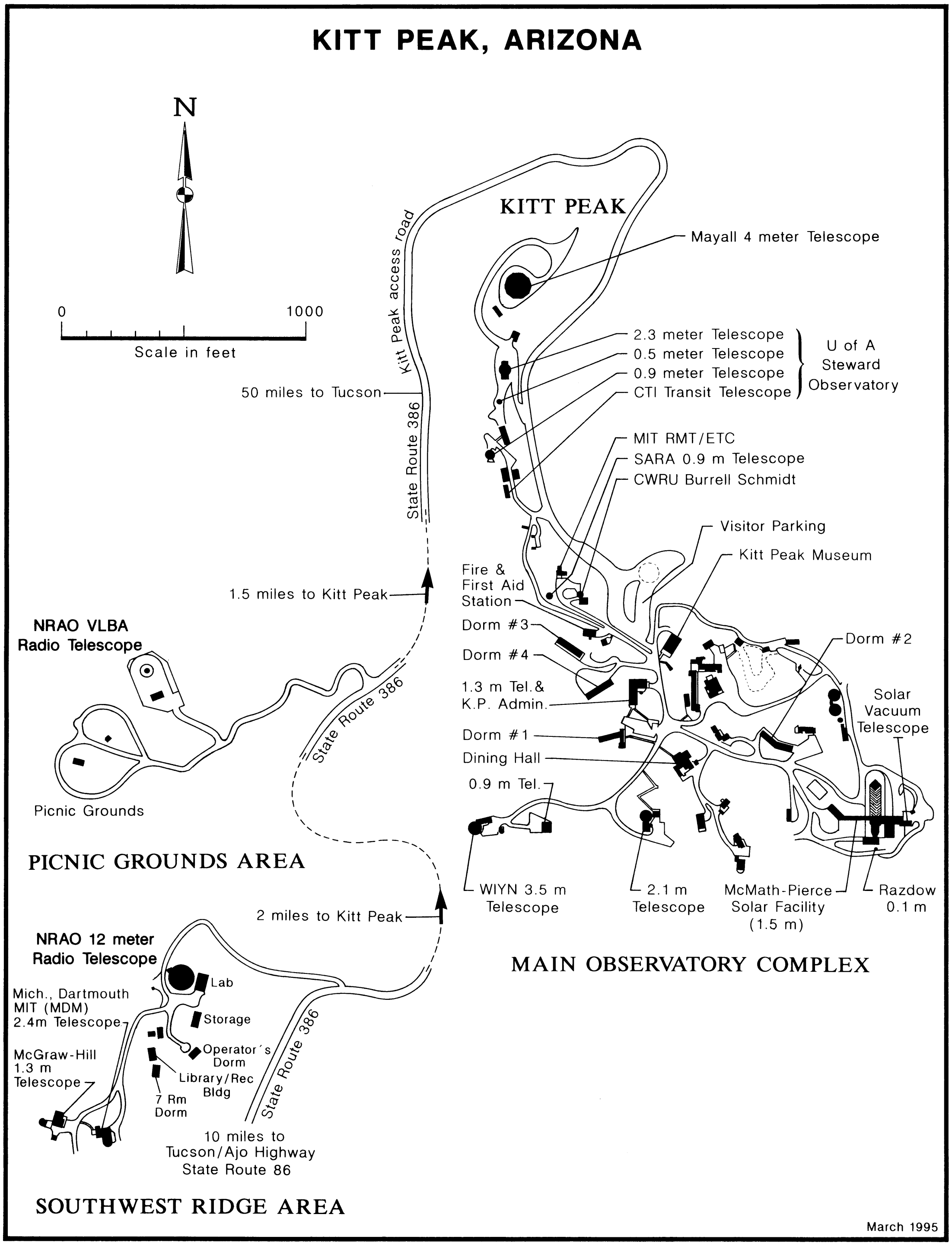

Figure 4: Map of the Kitt Peak National Observatory facilities.

obtain self-serve items. Requests for breakfast and night lunch preferences should be called in to the Kitt Peak Cafeteria Manager (extension 686) before 15:00 each day.

For observers who require laundry facilities, a free, self-service clothes washer and dryer are available in the recreation building on the summit.

4.4 Recreation and Leisure

A small library and lounge building, with a television and kitchenette, is located on the 12 Meter site. In addition, adjacent to the KPNO cafeteria at the summit, is a lounge with a color television, stereo, magazines and card tables. Pool tables, ping-pong tables, and shuffleboard are available for the observer's use at the recreation building. Candy bars, soft drinks, gum and cigarettes may be purchased either at the KPNO museum or in the recreation building.

4.5 Charges for Room and Board

Charges for meals and lodging are calculated as follows:

- On the first day of the observing run: Lodging ($15.00), plus the individual cost of any meals consumed (Breakfast – $5.50; Lunch – $8.00; Dinner – $10.00; Night Lunch – $6.50).
- On subsequent days: Flat Rate ($44.00). This fee covers all meals (whether eaten or not), lodging, and mountain services. Of this, $15.00 goes to the NRAO for lodging, and $29.00 is allocated to KPNO for food and other services.
- On the last day of the observing run, no charge for meals will be made if dinner is not eaten on the mountain.

To facilitate accounting, clipboards are provided at the entrance to the KPNO cafeteria. On the NRAO clipboard, observers should sign for all meals when they are taken; the column for lodging also should be checked for each night's stay on the mountain. All payments for meals and lodging are made to NRAO. There are several payment options available:

- Payment may be made in cash, check, or by credit card (VISA, MasterCard, Diner's Club, or Carte Blanche) at the Cherry Avenue office, between 08:00 and 15:30 Monday through Friday when you return the GSA car.
- You may sign an imprinted credit card form, which is available at the 12 Meter telescope, and we will fill in the amount for meals, lodging, and tapes, and send you a copy along with an itemized invoice which is marked "Paid".
- If you do not pay at the time of your visit, an invoice will be sent to you. Payment by check should be made within 30 days of receipt to:

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NRAO
Post Office Box O
Socorro, New Mexico  87801
ATTENTION:  Fiscal Division
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Note: International observers and U.S. observers who will be away from their home institutions for more than 30 days should make every effort to pay their bills at the Cherry Avenue office prior to departing.

4.6 Telephone

Long distance calls for business calls can be made directly from the telescope by dialing "9–1–area code–number". When making a personal long distance call, we encourage you to use a calling card, to reverse charges, or to bill to a third number. If this is not possible, please note your personal call on one of the log sheets kept by each telephone. The NRAO will bill you for the call later. Please note that NRAO is prohibited from absorbing the cost of personal telephone calls.

4.7 Library

A modest library with recent issues of principal astronomical journals and books is located in the KPNO administration building adjacent to the 1.3 m telescope on the mountain summit.

4.8 Safety

When observers arrive in Tucson to obtain a GSA vehicle, the keys will be placed in an envelope which states clearly observer responsibilities regarding vehicles and safety rules. We request observers carefully read both sides of the envelope before driving the vehicle.

5 Observing

5.1 Instrumentation/Software

Observers who require special hardware or software configurations should consult the following persons well in advance of their observations.

Electronics: John Payne

Observing Strategies: Jeff Mangum

Computer Software: Jeff Hagen, Tom Folkers, or Jeff Mangum

5.2 Propriety

Observers are scheduled on the telescope with the understanding that they are to pursue only the program described in their observing request. Since we have many observers from various institutions working on related programs, we require that any observer wishing to change his program or to exchange time with other observers, do so only with the consent of the Site Director.

5.3 Observer Comments

In an effort to improve our facilities and service, we request that observers completing their observations provide us with a brief summary of their experiences, remarks about any difficulties they encountered, or suggestions for improvements. These remarks are not normally kept confidential. Forms are available from the Operator and on the NRAO Tucson Home Page (http://www.tuc.nrao.edu/12meter.html).

5.4 User Manuals

Two User Manuals are available which describe in detail the telescope control, data acquisition and data reduction programs that are implemented at the 12 Meter:

- **User's Manual for the NRAO 12 Meter Telescope:** Describes observing setup, source catalogs, etc. Copies of this manual are available on the NRAO Tucson Home Page at http://www.tuc.nrao.edu/12meter.html.
- **Unipops Cookbook:** A guide to Unipops, the data analysis system for spectral line and continuum work. This manual is available in hardcopy form only and can be obtained on request.

Copies of the User's Manual can be found on the NRAO Tucson Home Page, while copies of the Unipops Cookbook can be found at the telescope and at the Tucson office.

5.5 Observer Assistance

At any time prior to, during, or after an observing run, specific questions regarding the operation of the telescope should be referred to Jeff Mangum. Since telescope time at the 12 Meter is so much in demand, observers will want to observe as efficiently as possible. We *strongly* encourage observers to discuss their observing plans with Jeff prior to their observations. This may enable one to optimize their observations and make the most effective use of their scheduled time.
Note: Questions regarding scheduling should be addressed to Simon Radford.

5.6 Getting Your Data on Tape

Observers may ftp their data via Internet, or they may purchase either an exabyte or DAT tape from the Observatory. DAT and exabyte tapes are $10.00 each; observers will be invoiced for tapes. The observer may elect to take the tape with him, or he may have the tape shipped to him. In either case, a Data Tape Request Form MUST be completed at the 12 Meter, before the observer leaves.

6 Publication of Results

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.

Whenever a significant portion of research was done, or observational material taken, at the NRAO, we request that the author include the following footnote in the text where the Observatory is mentioned:

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The National Radio Astronomy Observatory is a facility of the
National Science Foundation, operated under cooperative
agreement by Associated Universities, Inc.
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7 NRAO Tucson Office

7.1 Visitor Facilities

Office space is available for visitors to the NRAO downtown office; we encourage telescope users to spend time with us prior to or upon completion of their observations. Visitors will have access to a Sun Workstation for data reduction at a more considered pace. The downtown computer is equipped with a Postscript laser printer so that one can produce publication quality spectra and maps. In addition, visitors have access to a modest library in the NRAO office as well as to the Steward Observatory and NOAO libraries.

7.2 Information Sharing

The Arizona NRAO staff is very interested in the scientific results of the research that they support. Feedback, positive or negative, is desirable because it helps assure that our efforts are consonant with your goals. To this end, we would particularly appreciate it if you would summarize your work in a brief and very informal talk, a "brown-bag" lunchtime talk, while you are with us in Tucson. Let any of us know if you would be willing to give such a presentation.

8 NRAO Reimbursement

8.1 Travel Reimbursement

The NRAO will partially reimburse travel to and from the 12 Meter telescope under the following conditions:

- A reimbursement shall be made for one traveler only per observing program or data reduction session.
- A reimbursement request must be submitted within 30 days of the completion of travel.
- The NRAO will reimburse only the cost of round-trip economy or discount airfare. For airfare under $300, reimbursement will be the actual cost in excess of $150. For airfare in excess of $300, the reimbursement will be $150 plus 75% of the airfare in excess of $300.
- Original ticket receipts must be submitted to the NRAO when reimbursement is claimed.
- Only travel originating within the United States, Puerto Rico, or Hawaii will be considered for reimbursement.
- No reimbursement will be provided for lodging expenses or ground transportation.
- Reimbursement will be made only to supporting institutions and organizations, not to an individual.

This policy is limited to persons affiliated with U.S. institutions. Reimbursement will be provided for one round-trip per person. As a rule, the reimbursement can be provided to only one observer per observing program, although reimbursement can be made to a second person. If a second person desires travel reimbursement, he/she should petition the Arizona Site Director; the decision will be based on need and the current budget status of the Observatory. The secretary can provide the observer with a travel authorization form which the observer should send, together with the original air ticket stub, to the NRAO Fiscal Division, Post Office Box O, in Socorro, New Mexico 87801. Visitors should expect to pay for all lodging and meals connected with their visit the NRAO does not reimburse these charges.

8.2 NRAO Support for Page Charges

Users of the NRAO telescopes and facilities are encouraged to publish their scientific results in a timely manner. To this end, the NRAO provides partial page charge support to scientists at U.S. educational institutions. When requested, the NRAO will pay the larger of the following:

- One half (50%) of the page charges of papers reporting original observations made with NRAO instruments when at least one of the authors is eligible for support.
- One hundred percent (100%) of the page charges prorated by the fraction of authors who are NRAO staff members.

Further details can be found in the NRAO Newsletter of January, 1994 (No. 58), or the NRAO WWW Home Page at http://www.cv.nrao.edu/library/page_charges.html. The specific procedure to be followed to obtain page charge support is:

- At the time of submission, please send four publication copies of the paper to the NRAO Librarian, Charlottesville, Virginia, indicating the journal to which the paper has been submitted. The copies are for the four NRAO site libraries. If you wish to have the preprint placed at the 12 Meter telescope, send one additional copy and indicate that it is for the telescope. The Observatory does not review visitors' publications prior to submittal.

- At the time of acceptance for publication, please notify the Librarian in Charlottesville of the proposed date of publication and apportionment of page charges, so that the necessary purchase orders can be initiated.

- Authors who wish to have the full electronic text of their preprints included on the NRAO WWW preprint page should contact the NRAO Librarian in Charlottesville (library@nrao.edu) or read the instructions to authors on the WWW page at (http://www.cv.nrao.edu/library/intro_preprints.html).

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

9 Attachments

- Observing Application Cover Sheet
- Data Tape Request Form
- Observer's Comment Sheet

National Radio Astronomy Observatory
12 Meter Telescope

NRAO USE ONLY
Proposal Identifier:
Date Received:

OBSERVING APPLICATION

Deadlines: January 1 for observing period April 1 through July 15
July 1 for observing period September 15 through December 31
October 1 for observing period January 1 through March 31

Date (yyyy-mm-dd): **Number of Pages:**

Title:

Investigator	Institution	Who Will Observe?	Graduate Students: PhD Thesis Observations?	Graduate Students: Anticipated PhD Year?

Scientific Categories: Atmospheric ○ Planetary ○ Solar ○ Stellar ○ Galactic ○ Extragalactic ○

Observing Modes: Spectra ○ Continuum ○ OTF ○ VLBI ○ Other (specify): ○

Receivers: 68-90 GHz ○ 90-116 GHz ○ 130-170 GHz ○ 200-265 GHz ○ 265-300 GHz ○
215-245 GHz Array ○ 90-116 GHz Array ○

Spectrometers: **Filter Banks:** 30kHz ○ 100kHz ○ 250kHz ○ 500kHz ○ 1MHz ○ ○ (1, 2) 2MHz ○ ○ (1, 2)
Correlator: MAC/2IF ○ MAC/4IF ○ MAC/8IF ○

Frequencies:

Intervals Requested: **Hours Per Interval Requested:**

LST range(s): from: to: number of intervals:
from: to: number of intervals:
from: to: number of intervals:

Special requirements *(dates, etc...)*:

Contact Author for Scheduling:

ABSTRACT

Please attach complete addresses of all investigators and a (less than 1000 word) proposal that contains:
(1) Scientific Justification; (2) Observing Strategy; (3) Source List with Coordinates.

After your proposal is scheduled, the contents of this cover sheet become public information (supporting documents are for referees only).

For NRAO Internal Use Only Revised 1998-01-13

NRAO 12-m Telescope

Kitt Peak, Arizona

DATA TAPE REQUEST FORM

Attention: ALL OBSERVERS

Please complete this form **at the conclusion of your observing run** and **prior to departure** from the 12m Telescope.

In lieu of, or in addition to, electronically transmitting your data to your home institution, Exabyte and DAT tapes are available for transport of data. We encourage you to write the tape(s) prior to your departure so they can be taken with you. If this is not possible, the tape(s) can be shipped to you at a later date. We can copy raw data and the contents of your obs/directory which may include reduced Unipops data. We cannot copy reduced AIPS data; that remains your responsibility.

The cost per tape is $10, inclusive of shipping and handling. This fee will be invoiced with your meals and lodging charges if you take the tape(s) with you. Tapes shipped later will be billed separately.

Name ____ Date ______________________

Institution ____________________________________

Please indicate your preference from the following:

___ All data via FTP to home institution

___ Take data via #___ Exabyte tape(s)

___ Take data via #___ DAT tape(s)

___ Request data via #___ Exabyte tape(s) or #___ DAT tape(s) to be shipped to:

____

____

____

Requested data format to be:

___ FITS (from SDD — does not include OTF data)

___ SDD (Unipops)

If you have questions about your data format, please contact Tom Folkers (tfolkers@nrao.edu) or Jennifer Neighbours (jneighbo@nrao.edu). Thank you. *Updated 1/16/97*

OBSERVER'S COMMENT SHEET

Program: ____________ **Receiver:** ____________ **Date of Run:** ____________

Your Name: ____________ **Phone:** (___) ____________

E-mail: ____________

In an attempt to assess whether observers on NRAO telescopes are experiencing any problems or difficulties connected with their visits to the site, the Observatory is encouraging each observing team to complete this form and turn it in to the Site Director's Office. You may wish to comment on our policies or procedures, and it will be especially valuable for us in our continuing concern for how we are handling the observing programs. The site director will send copies of this report to the Director's Office and to any other individual(s) whom you may name, below. We will do our best to improve the operation, based on your suggestions. Thank you.

How clear and complete did you find our user and data analysis manuals?

How well did the equipment (*including software*) operate?

How effective were the support services?

Did you accomplish your scientific objectives?

Observer: Please send the original of this sheet to the site Director who will then distribute it to the Director's Office and to any other individuals whom you may name below.

Others (by name): ____________