List of Radio and Radar Astronomy Observatories (1983)

Pages
46

Size
10 x 8

ISBN
0309326222

Committee on Radio Frequencies; National Academy of Engineering

LIST OF RADIO AND RADAR ASTRONOMY OBSERVATORIES

INTRODUCTION

The information on the radio astronomy antennas and on the frequencies being monitored at the U.S. Radio and Radar Astronomy Observatories was provided by the Operating Administrations of the Observatories. The information on the antennas and frequencies at the Foreign Radio Astronomy Observatories was obtained from several different sources which are listed at the beginning of Section IV. The general information on the characteristics of the radio astronomy telescopes and the frequencies that are being monitored are used by the Committee on Radio Frequencies (CORF) in advising on the frequency protection needed at the U.S. Observatories. In addition, the list is distributed to all Radio Astronomy Observatories, the Federal Communications Commission, National Telecommunications and Information Administration, Department of Defense Electromagnetic Compatibility Analysis Center (ECAC), other Government agencies, and the Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF), to keep them informed of the frequencies being used at the Observatories.

This list of the use of frequencies by the Observatories is extremely helpful in justifying the need for continued protection or for allocation of new bands to the radio astronomy service. Information from this list is also used in preparing reports for submission to the International Frequency Registration Board (IFRB) on frequencies to be received by U.S. radio astronomy stations. U.S. Observatories should notify CORF of any changes in frequencies being monitored so that this list can be kept current. Annually, the Operating Administrations of U.S. Observatories will be asked to confirm or correct the information for their Observatory.

The list is divided into five sections. Section I gives general information about the U.S. Observatories and the characteristics of the radio astronomy telescopes. Section II lists the frequencies being monitored for radio astronomy observations at U.S. Observatories; a summary of frequencies being monitored is included at the end of this section. Section III lists the frequencies being used for radar astronomy observations at U.S. Observatories. Section IV gives general information about Foreign Observatories and the characteristics of the radio astronomy telescopes. Section V lists the frequencies being monitored for radio astronomy observations at Foreign Observatories.

INTERNATIONAL RADIO ASTRONOMY ALLOCATIONS (1979 World Administrative Radio Conference)

Frequency Band	*Protection Status (Footnote Type)*	*Use*
13,360-13,410 kHz	Primary shared with active (2)	Cont.
25,550-25,670 kHz	Primary exclusive (special)	Cont.
37.5-38.25 MHz	Secondary (2)	Cont.
73-74.6 MHz	Primary exclusive in Region 2*	Cont.
	Notification of Use in Region 1 & 3 (2)	
150.05-153 MHz	Primary shared with active only in Region 1, Australia and India (2)	Cont.
322-328.6 MHz	Primary shared with active (2)	Cont. and D
406.1-410 MHz	Primary shared with active (2)	Cont.
608-614 MHz	Primary (active secondary) in Region 2	Cont.
	Permitted in African Broadcast Area	
	Secondary in Regions 1 & 3 (2)	
1330-1400 MHz	Notification of Use (2)	H
1400-1427 MHz	Primary — passive band (1)	H
1610.6-1613.8 MHz	Secondary (2)	OH
1660-1660.5 MHz	Primary shared with active (2)	OH
1660.5-1668.4 MHz	Primary (active secondary) (2)	OH
1668.4-1670 MHz	Primary shared with active (2)	OH
1718.8-1722.2 MHz	Secondary (2)	OH
2655-2690 MHz	Secondary (2)	Cont.
2690-2700 MHz	Primary — passive band (1)	Cont.
3260-3267 MHz 3332-3339 MHz 3345.8-3352.5 MHz	Notification of Use (2)	CH
4800-4990 MHz	Secondary (2)	Cont. & H_2CO
4990-5000 MHz	Primary shared with active (2)	Cont.
10.6-10.68 GHz	Primary shared with active (2)	Cont.
10.68-10.7 GHz	Primary — passive band (1)	Cont.
14.47-14.5 GHz	Secondary (2)	H_2CO
15.35-15.4 GHz	Primary — passive band (1)	Cont.
22.01-22.21 GHz	Notification of Use (2)	H_2O
22.21-22.5 GHz	Primary shared with active (2)	H_2O
22.81-22.86 GHz 23.07-23.12 GHz	Notification of Use (2)	NH_3

Frequency Band	*Protection Status (Footnote Type)*	*Use*
23.6-24 GHz	Primary — passive band (1)	Cont. and NH_3
31.2-31.3 GHz	Notification of Use (2)	Cont.
31.3-31.5 GHz	Primary — passive band (1)	Cont.
31.5-31.8 GHz	Primary — passive band in Region 2 (1)	Cont.
	Primary (active secondary) in Regions 1 & 3 (2)	
36.43-36.5 GHz	Notification of Use (2)	H^+
42.5-43.5 GHz	Primary shared with active (2)	Cont. and SiO
48.94-49.04 GHz	Primary shared with active (2)	CS
51.4-54.25 GHz 58.2-59 GHz 64-65 GHz	Notification of Use — passive bands (1)	Cont.
72.77-72.91 GHz	Notification of Use (2)	H_2CO
86-92 GHz	Primary — passive band (1)	Many lines
93.07-93.27 GHz	Notification of Use (2)	HN_3^+
97.88-98.08 GHz	Primary shared with active (2)	CS
105-116 GHz	Primary — passive band (1)	CO
140.69-140.98 GHz	Primary shared with active (2)	H_2CO
144.68-144.98 GHz		DCN
145.45-145.75 GHz		H_2CO
146.82-147.12 GHz		CS
150-151 GHz	Secondary (2)	NO, H_2CO
164-168 GHz	Primary — passive band	Cont.
174.42-175.02 GHz	Secondary (2)	C_2H
177-177.4 GHz		HCN
178.2-178.6 GHz		HCO^+
181-181.6 GHz		HCN
182-185 GHz	Primary — passive band (1)	H_2O
186.2-186.6 GHz	Secondary (2)	HN_3^+
217-231 GHz	Primary — passive band (1)	CO
250-251 GHz	Primary — passive band (2)	NO
257.5-258 GHz	Secondary (2)	NO
262.24-262.76 GHz	Primary shared with active (2)	C_2H
265-275 GHz	Primary shared with active (2)	HCN, HCO^+, HCN
278-280 GHz 343-348 GHz	Notification of Used (not allocated)	HN_3^+ CO

Footnote Types: (1) All emissions in the band between the frequencies listed are prohibited. (2) In making assignments to stations, administrations are urged to take all practicable steps to protect radio astronomy from interference. Emissions from space or airborne stations can be particularly serious sources of interference.

* In the international Radio Regulations, the world is divided into three regions roughly as follows: (1) Europe and Africa; (2) Western Hemisphere; and (3) Asia and Australia.

LIST OF RADIO AND RADAR ASTRONOMY OBSERVATORIES

REMARKS AND EXPLANATIONS

(The metric system is used in these lists. Most of the columns in the lists are self-explanatory.)

Section I & IV General Information:

Col. 1 Name of station or observatory, name of locality in which it is situated, longitude and latitude in degrees and minutes, altitude in meters.

Col. 2 Postal address of operating administration, name and telephone number of person to contact for information on astronomy program.

Col. 3 Organizations which sponsor radio astronomy programs.

Col. 4 Type, size and height of antenna above ground (usually to center of antenna) in meters.

Col. 5 Sky coverage in azimuth and elevation.

Col. 6 Effective collecting area in square meters.

Col. 7 Polarization of antenna - horizontal, vertical circular, linear, 45°, rotating, elliptical, variable, helical circular right-hand sense, helical circular left-hand sense.

Col. 8 Remarks - additional information.

Section II & V Frequencies Being Monitored for Radio Astronomy Observations:

Col. 1 Name of station or observatory, longitude and latitude in degrees and minutes.

Col. 2 Type of telescope.

Col. 3 Type of observation - purpose of observation; i.e., solar, lunar, planetary, galactic, extragalactic, continuum, spectrum line observations, etc.

Col. 4 Class of observation - IFRB classification. Class "A" observations are those in which the sensitivity of the equipment is not a primary factor. Class "B" observations are those of such a nature that they can be made only with advanced low-noise receivers using the best techniques.

Col. 5 Frequency - center of the frequency band observed or planned to be observed, in kHz up to 30,000 inclusive, in MHz from 30 MHz to 10,000 MHz inclusive, and GHz above 10 GHz. Frequencies not presently being used but planned for future use are in parentheses.

Col. 6 Bandwidth - width of the frequency band observed by the station.

Col. 7 Noise Temperature - overall receiving system noise temperature in degrees Kelvin (°K).

Col. 8 Hours of Reception - maximum daily hours of reception (24 hrs., 10-22 GMT, etc.).

Col. 9 Dates of Operation - date on which reception of the frequency band began or is scheduled to begin (if known) and date when observations are scheduled to be discontinued (if known). Continuous or variable.

Col.10 Remarks - additional information on the observation.

Section III Frequencies Being Used for Radar Astronomy Observations:

Col. 1-3, 5-6, 8-10 Same as Section II.

Col. 4 Class of Emissions - as specified in Section I of Article 2 of the ITU Radio Regulations.

(1) Type of modulation of main carrier

A - Amplitude

F - Frequency (or Phase)

P - Pulse

(2) Type of transmission

0 - Absence of any modulation intended to carry information

1 - Telegraphy without the use of a modulating audio frequency

2 - Telegraphy by the on-off keying of a modulating audio frequency or audio frequencies, or by the on-off keying of the modulated emission (special case: an unkeyed modulated emission)

3 - Telephone (including sound broadcasting)

4 - Facsimile (with modulation of main carrier either directly or by a frequency modulated sub-carrier)

5 - Television (vision only)

6 - Four-frequency diplex telegraphy

7 - Multichannel voice-frequency telegraphy

9 - Cases not covered by the above

(3) Supplementary characteristics

A - Single sideband, reduced carrier

H - Single sideband, full carrier

J - Single sideband, suppressed carrier

B - Two independent sidebands

C - Vestigial sideband

D - Pulse, amplitude modulated

E - Pulse, width (or duration) modulated

F - Pulse, phase (or position) modulated

G - Pulse, code modulated

The normal classification for radar emission is PO.

Col. 7 Power - transmission power in kilowatts.

C O N T E N T S

U.S. RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
ALASKA							
Chena Valley Radio Facility Chena Valley, Alaska 64°52'14" N 146°50'34" W	Geophysical Institute University of Alaska College, Alaska 99735	NSF	1)18.6 m steerable paraboloid 2)Two 8.53 m steerable, polar mounted paraboloids providing interferometer				Inactive, standby status
ARIZONA							
National Radio Astronomy Observatory Tucson, Arizona 31°57'10" N 11°36'50" W 1930 meters	National Radio Astronomy Observatory 2010 North Forbes Blvd. Suite 100 Tucson, AZ 85705 (602) 882-8250 (M.A. Gordon)	Associated Universities, Inc. under contract with NSF	11 m parabolic, 19.5m Alt - Az	0° - 360° azimuth 15° - 90° elevation	51 m^2 @ 55% eff.	Linear, circular	High precision reflector mounted in an astrodome
CALIFORNIA							
Clark Lake Radio Observatory University of Maryland Borrego Springs, California 33°20.3' N 116°16.8' W 170 meters	Clark Lake Radio Observatory P.O. Box 128 Borrego Springs,Calif.92004 (714) 767-5381 (William C. Erickson)	NASA, NSF and University of Maryland	1) 720 spiral helix antennas in T-shaped array 3000 m E-W, 1800 m N-S, 5 m	1) 45° E-W of zenith 60° N-S of zenith	1) 200X $(\text{wavelength})^2$	1)Left circular	
	AP&IS Department University of California La Jolla, Calif. 92093 (W.A. Coles) (B.J. Rickett)	NSF	2)Phased array, 256 element filled-aperture, 73.8 MHz only	2)Full sky	2)3000 m^2	2)Linear E-W	2)One of three arrays used continuously for scintillation observations
Hat Creek Radio Astronomy Station Cassel, C lifornia 40°49'03" N 121°28.4' W 1012 meters	Radio Astronomy Laboratory (0349) Astronomy Department University of California Berkeley, Calif. 94720 (415) 642-5724 (Dave D. Cudaback)	NSF, ONR and University of California	1)26 m steerable paraboloid, equatorial mount 2)Two 6 m steerable paraboloids, alt.-azimuth mounts, T baseline, 302 m E-W, 152 m N-S	1)Full sky 2)Full sky	1)300 m^2 2)16 m^2 @ 55% eff.	1)Horizontal and vertical 2)All Stokes parameters measurable	2)Used separately and as interferometer
Owens Valley Radio Observatory Big Pine, California 37°13.9' N 118°17.6' W 1216 meters	Owens Valley Radio Observatory PO Box 387 Big Pine, Calif. 95313 (714) 938-2481 (Alan T. Moffett)	Calif. Inst. of Technology with support from NSF	1)Two 27.4 m steerable paraboloids, 13.7 m 2)39.6 m steerable paraboloid, 19.8 m 3)Three 10.4 m steerable paraboloids, 5.3 m	1)H.A. +60° to -60° Dec. +90° to -54° 2)All zenith less than than 80° 3)All z.a <80°, all az.	1)325 m^2 @ 55% eff. 2)678 m^2 @ 55% eff. 3)47 m^2 @ 55%	1)Linear-rotating except all types when used as an interference polar polarimeter 2)All 3)All	1)Can be located at stations along L-shaped baseline 488 m N x 488 m W frequencies 100-10,000 MHz 2)Telescope at 37°13.9'N, 118°16.9'W, altitude 1220 meters frefrequencies 100 MHz, 130 GHz 3)Variable spacing interferometer, 520 m T baseline, frequencies 40 - 300 GHz
Space Radio Systems Facility Los Angeles Air Force Station El Segundo, California 33°54'52.56" N 118°22.5' W 38 meters	The Aerospace Corporation Electronics Research Lab. Building 130, Mail Sta. 422 Box 92957 Los Angeles, CA 90009 (Eugene E. Epstein)	The Aerospace Corp., NSF and NASA	4.57 m paraboloid circular aperture, Cassegrain, polar mount, 10 m	Full sky	9.04 m^2 55% eff. @ 3.2 mm	Linear and parallel to dec. axis	

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Name, Location and Altitude	Operating Administration (information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
CALIFORNIA (con't)							
NELC La Posta Space Geophysics Research Facility 32°40'39.3" N 116°26'06.4" W 1172 meters	Naval Electronics Laboratory Center Code 2200.1 San Diego, Calif. 92152 (714) 478-5541 (Max P. Bleiweiss)	NELC, AFCRL, NASA	1)18.3 m paraboloid, Cass. feed, Az-El mount, 15.2 m 2)2.44 m paraboloid, equatorial mount, 6.0 m 3)0.91 m paraboloid, equatorial mount, 6.0 m	1)Full sky 2)Full sky 3)Full sky		1)Linear 2)Linear 3)Linear	
	AP&IS Department University of California La Jolla, California 92093 (W.A. Coles) (B.J. Rickett)	NSF	4)Phased array, 256 element filled-aperture, 73.8 MHz only	4)Full sky	4)3000 m^2	4)Linear E-W	4)One of three arrays used continuously for scintillation observations
Dawson-Los Monos Reserve Carlsbad 33°9'00" N 117°15'22.5" W 122 meters	AP&IS Department University of California La Jolla, California 92093 (W.A. Coles) B.J. Rickett)	NSF	1)Phased array, 256 element filled-aperture, 73.8 MHz only	1)Full sky	1)3000 m^2	1)Linear E-W	1)One of three arrays used continuously for scintillation observations
Stanford Radio Astronomy Institute Stanford, California 37°23.9' N 122°11.3' W 80 meters	Radio Astronomy Institute Stanford University Stanford, Calif. 94305 (415) 497-2300, Ext. 3546 (Prof. Ronald N. Bracewell)		1)32-element cross, 3 m 2)5-element array, 18 m	1)Complete 2)Complete	1)50 m^2 2)600 m^2	1)Horizontal-Linear 2)All Stokes parameters measurable	Inactive stand-by status
Stanford Center for Radar Astronomy Stanford, California 37°24'31" N 122°10'42" W 171 meters	Center for Radar Astronomy Durand Building Stanford University Stanford, Calif. 94305 (415) 321-2300, Ext. 3537 (Dr. N. T. Howard)	NASA	45.7 m paraboloid, 26 m	0°- 360° azimuth 0°- 90° elevation	1640 m^2		Used both for radio and radar astronomy
NASA/JPL Goldstone Deep Space Communication Complex Goldstone, California 35°25'30" N 116°52'40" W 1050 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	1)64 m paraboloid with Cass. feed, 70 m 2)25.9 m paraboloid with Cass. feed, 33 m 3)9.15 m paraboloid with Cass. feed, 12 m 4)25.9 m paraboloid with Cass. feed, 35.1 m 5)25.9 m paraboloid with Cass. feed, 35.1 m	1)0°- 360° azimuth 0°- 90° elevation 2)0°- 360° azimuth 0°- 90 elevation 3)0°- 360° azimuth 0°- 90° elevation 4)H.A. -90° to +90° Dec. -8° to +90° H.A. decreases for Dec. -48° to -8° 5)H.A. -90° to +90° Dec. -8° to +90° H.A. decreases for Dec. -44° to -8°	1)1950 m^2 @ 60% eff. 2)300 m^2 @ 57% eff. 3)131.44 m^2 @ 50% eff. 4)300 m^2 @ 57% eff. 5)300 m^2 @ 57% eff.	1)RCP, LCP, Rotating-Linear, Switch Select. 2)RCP, LCP, Switch Select. 3)Linear 4)RCP, LCP, Switch Select. 5)RCP, LCP, Switch Select.	1)Mars site - 1050 meters, 35°25'30" N 116°52'40" W 2)Venus site-1093.5 meters, 35°14'52" N 116°47'38" W 3)Venus site - 1093 meters, 35°14'50" N 116°47'26" W 4)Pioneer site - 1036.3 meters, 35°23'22" N 116°50'55" W 5)Echo site - 988.6 meters, 35°18'00" N 116°48'17" W Primary use in Deep Space Probe Tracking RA secondary use
Table Mountain Radio Observatory Wrightwood, California 34°22'54" N 117°04'51" W 2288 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	5.49 m paraboloid with Cass. feed, 6 m 3.05 m paraboloid	0°- 360° azimuth 0°- 90° elevation	12 m^2 @ 50% eff.	Linear	Planetary spectral and thermal radiation characteristics

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COLORADO							
Table Mountain Boulder, Colorado 40°05'28" N 105+07'24" W 1692 meters	Space Environment Laboratory Environmental Research Laboratories NOAA Boulder, Colorado 80302 (303) 499-1000, Ext. 4211 (D.L. Hilliard)	NOAA	1)Quad 12-element Yagis 2)Dual 17-element Yagis 3)Quad 15-element Yagis 4)2.4 m parabolic dish 5)2 m parabolic dish	1)240° x 80° 2)240° x 80° 3)240° x 80° 4)210° x 80° 5)180° x 60°		1)Linear 2)Linear 3)Linear 4)Linear 5)Linear	Used for Solar flare patrol
Radio Astronomy Observatory University of Colorado Nederland, Colorado 39°57' N 105°31'W 2650 meters	Department of Astro-Geophysics University of Colorado Boulder, Colorado 80301 (Dr. James W. Warwick)	NSF and University of Colorado	1)Steerable spectrographic interferometer 2)Fixed arrays (interferometer) 3)Polarimeter	1)Full sky 2)Transit 3)Full sky		1)Linear 2)Linear 3)Linear and Circular	
FLORIDA							
University of Florida Radio Observatory Dixie County, Florida 29°32' N 83°02' W 6 meters	Department of Physics and Astronomy University of Florida Gainesville, Florida 32603 (904) 392-2052 (Dr. T.D. Carr) (Dr. A.G. Smith)	University of Florida and NSF	1)Four 5-element Yagis, equatorial mounts 2)7-element Yagi, equatorial mount 3)Pair of crossed 5-element Yagis, alt.-azimuth mount 4)20-dipole N-S linear array 5)640-dipole filled rectangular array	1)Full sky 2)Full sky 3)Full sky 4)Phase-steered N and S; broad E-W beam (60°) 5)Phase-steered E-W and N-S to any direction within 45° of zenith	1)360 m^2 @ 15 MHz to 170 m^2 @ 22.2 MHz 2)130 m^2 @ 27.6 MHz 3)250 m^2 @ 18 MHz 4)800 m^2 @ 20 MHz 5)20,000 m^2 @ 26.3 MHz	1)Linear 2)Linear 3)Circular or Linear 4)Linear 5)Linear	3) For polarization measurement
HAWAII							
Palehua Observatory Oahu, Hawaii 21°25' N 158°05' W	Hq AWS/DOS Scott AFB, Illinois 62225	USAF	1)2.44 m diameter paraboloid equatorial height 5 m at 1700 ft elevation 2)8.5 m parabola equatorial mount height 20 m at 1700 ft elevation 3)91 cm parabola equatorial mount height 4 m at 1700 ft elevation 4)2 element interferometer	1)H.A. horizon to horizon Dec. -30° to +30° 2)H.A. horizon to horizon Dec. -33° to +33° 3)H.A. horizon to horizon Dec. -30° to +30°	1)2.33 m^2 @ 50% eff. 2)31.5 m^2 @ 55% eff. 3)0.359 m^2 @ 50% eff.	1)lin-vertical at 0 hrs 2)lin-vertical at 0 hrs 3)lin-vertical at 0 hrs 4)lin-horizontal E-W array	1)Actual routine color flux and bursts 2)Actual routine color flux and bursts 3)Actual routine color flux and bursts 4)Sweep freq solar patrol

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ILLINOIS							
Vermillion River Observatory Danville, Illinois 40°03'38" N 87°33'49" W 202 meters	University of Illinois 60 Electrical Engineering Building Urbana, Illinois 61801 (217) 333-2930 (Dr. George W. Swenson, Jr.)	University of Illinois	36.6 m paraboloid, equatorial mount, 32 m	From 40° above S to 50° above N horizon, and from 45° above E to 45° above W horizon	400 m^2	Rot. Linear and both circular modes	
IOWA							
North Liberty Radio Observatory North Liberty, Iowa 41°46'11" N 91°34'22" W 241 meters	Department of Physics and Astronomy The University of Iowa Iowa City, Iowa 52240 (Dr. S. Shawhan)	NASA and ONR	1)1.2 m Cassegrain 2)Dual 5-element Yagis 3)16-element phased dipole array 4)3-element Yagi 5)18.3 m paraboloid	1)0° - 360° azimuth 0° - 90° elevation 2)0° - 360° azimuth 0° - 90° elevation 3)30° from zenith in any direction 4)Full sky	1)0.6 m^2 2)160 m^2 3)520 m^2 4)100 m^2	1)Dual Linear 2)Linear 3)Linear N-S 4)Linear	
MARYLAND/D. C.							
Maryland Point Observatory Riverside, Maryland 38°22'26" N 77°14.0' W 8 meters	Radio Astronomy Branch Naval Research Laboratory Washington, D. C. 20390 (202) 767-3670 (John W. Boland) (Cornell H. Mayer)	ONR	1)25.9 m parabolic reflector, 20 m to focal pt. 2)25.6 m parabolic reflector, 20 m to focal pt.	1)H.A. +75° to -75° Dec. +90° to -53° 2)H.A. 0° to 360° Dec. +90° to -52°	1)316 m^2 @ 60% eff. 2)309 m^2 @ 60% eff.		
U.S. Naval Research Laboratory Washington, D. C. 38°49'17" N 77°01.6' W 7 meters	Radio Astronomy Branch Naval Research Laboratory Washington, D. C. 20390 (202) 767-3670 (John W. Boland) (Cornell H. Mayer)	ONR	15.2 m parabolic reflector, 40 m to focal pt.	0°- 360° azimuth 0°- 90° elevation	109 m^2 @ 60% eff.		Altitude-azimuth mount
University of Maryland Observatory College Park, Maryland 39°00' N 76°57' W 65 meters	Astronomy Program University of Maryland Space Science Building College Park, Maryland 20742 (301) 454-3001 (Dr. William C. Erickson)	University of Maryland	1)6.1 m parabolic dish, 6 m 2)2-element interferometer, 20 m	1)Full sky 2)Full sky (broad beam)	1)19 m^2 2)200 m^2	1)Linear-Horizontal 2)Linear	1)Mainly used for training 2)Mainly used for training

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			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
MASSACHUSETTS							
George R. Agassiz Station Harvard, Massachusetts 42°30'13" N 71°33.5' W 183 meters	Harvard College Observatory 60 Garden Street Cambridge, Mass. 02138 (617) 495-3971 (Dr. A.E. Lilley)	Harvard Univ., NSF and SAO	25.6 m paraboloid, equatorial mount, Cassegrain feed	H.A. -6h to 7h Dec. horizon to 80°	200 m^2	Variable	
Five College Radio Astronomy Observatory Quabbin Reservation New Salem, Massachusetts 42°23'33.2" N 72°20'40.4" W 306 meters	Radio Astronomy, Tower B Hasbrouck Laboratory University of Massachusetts Amherst, Mass. 01003 (413) 545-0789 or -0623 (Prof. G.Richard Huguenin)	NSF and Univ., of Mass.	1)Four 37 m spherical reflectors, 20 m 2)14 meter paraboloid in 20 m radome	1)32° zenith angle 2)Full sky	1)2000 m^2 2)75 m^2	1)Orthogonal linear 2)Varied	1)Used for daily pulsar observations 156, 390 MHz 2)Millimeter telescope used 20-240 GHz
Haystack Observatory Northeast Radio Observatory Corporation Tyngsboro, Massachusetts 42°37'23" N 71°29'19" W 145 meters	MEROC Haystack Observatory Westford, Mass. 01886 (617) 692-4765 (Dr. M.L. Meeks)	NSF and NASA	36 m paraboloid, Az-El mount, 24 m	Full sky	470 m^2 @ 3.8 cm wavelength	Linear or Circular	Antenna enclosed in radome
Sagamore Hill Radio Observatory Hamilton, Massachusetts 42°37'54.36" N 70°49.15" W 100 meters	AFCRL (LIR) L.G. Hanscom Field Bedford, Mass. 01730 (617) 274-6100, Ext. 2944 (Dr. Jules Aarons)	USAF and AFSC	1)25.6 m parabola, equatorial mount, 18 m	1)H.A. Full sky Dec. -48° to +90°	1)515 m^2	1)Linear	1)Telescope at 42°37'51.18" N 70°48'55.4" W, 56.4 m Drive speed 15°/min, variable & track
			2)8.5 m parabola, equatorial mount, 15 m	2)Full sky	2)31.5 m^2 @ 55% eff.	2)Lin.-vertical at 0 hrs.	2)Routine Solar
			3)8.5 m parabola, equatorial mount, 20 m	3)Full sky	3)31.5 m^2 @ 55% eff.	3)Lin.-vertical at 0 hrs.	3)Routine Solar
			4)2.44 m parabola equatorial mount, 10 m	4)H.A. Full sky Dec. -30° to +30°	4)2.23 m^2 @ 50% eff.	4)Lin.-vertical at 0 hrs.	4)Routine Solar
			5)91 cm parabola equatorial mount, 5 m	5)H.A. Full sky Dec. -30° to +30°	5)0.359 m^2 @ 50% eff.	5)Lin.-vertical at 0 hrs.	5)Routine Solar
			6)45 cm parabola, equatorial mount, 5 m	6)H.A. Full sky Dec. -30° to +30°	6)0.039 m^2 @ 50% eff.	6)Lin.-vertical at 0 hrs.	6)Routine Solar
			7)3-element array (183 cm parabolas)			7)All Circular and Linear	7)Solar Polarization
			8)2-element interferometer			8)Lin.-Horizontal E-W array	8)Sweep Frequency, Solar Patrol
MICHIGAN							
University of Michigan Radio Astronomy Observatory Dexter, Michigan 42°23'55.9" N 83°56'10.5" W 345 meters	Radio Astronomy Observatory Physics-Astronomy Building Room 937 University of Michigan Ann Arbor, Michigan 48104 (313) 764-3430 (Dr. F.T. Haddock) (Dr. Theodore V. Seling)	NSF	1)25.9 m paraboloid, 30 m equatorial mount 2)8.5 m paraboloid, 10 m equatorial mount	1)85° E and W 85° N and 45° S 2)90° E and W 90° N and 48° S	1)237 m^2 @ 45% eff. 2)28 m^2 @ 50% eff.	1)Linear-rotating 2)Linear	
NEW JERSEY							
Bell Laboratories Holmdel, New Jersey 40°23'31" N 74°11'15" W 114 meters	Bell Laboratories at Crawford Hill Holmdel, New Jersey 07733 (201) 949-4683 (Richard A. Linke)	Bell Laboratories	1)7m steerable paraboloid	1)Full sky	1)19 m^2 @ 50% eff. @ 3 mm	1)Variable	
			2)6.1 m horn reflector	2)Full sky	2)26 m^2 @ 70% eff. @ 21 cm	2)Variable	

U.S. RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
NEW MEXICO							
National Radio Astronomy Observatory, Very Large Array 52 miles West of Socorro, N. M. between Magdalena, N.M. and Datil, N.M. on Highway 60 34°04'43" N 107°37'04" W 2124 meters	National Radio Astronomy Observatory P.O. Box "O" Socorro, New Mexico 87801 (505) 835-2924 (Dr. R.D. Ekers)	Associated Universities, Inc. under contract with the NSF	Array of 27 fully steerable, parabolic reflectors, each 25 meters diameter with Cassegrain feed system	Elevation greater than 9°	491 m^2 @ 65% eff. per reflector	Simultaneous orthogonal circular or linear	Four scaled configurations available in which the most distant antenna is 0.6, 1.9, 6.4 or 21 km from the array center. Antennas moved through all four configurations in a period of apprx. 15 months
OHIO							
Ohio State-Ohio Wesleyan Radio Observatory Delaware, Ohio 40°15.1' N 83°02.9' W 282 meters	Ohio State University Radio Observatory 2015 Neil Avenue Columbus, Ohio 43210 (614) 293-6789 (Dr. Robert S. Dixon) (Dr. J. D. Kraus)	NSF	103.8 x 21.4 m standing parabola with tiltable flat reflector, 30 m	H.A. 0° to 360° Dec. -36° to +65°	1000 m^2 @ 1415 MHz	Linear- parallel to meridian	Telescope is meridian transit type

U.S. RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
PUERTO RICO							
Arecibo Observatory Arecibo, Puerto Rico 18°21'13" N 66°45'11" W 365 meters	Arecibo Observatory National Astronomy and Ionosphere Center Box 995 Arecibo, P. R. 00612 (809) 878-2612 (Dr. M.M. Davis)	Cornell University under contract with NSF	305 m spherical reflector, feed 30 m above surrounding hills	0°- 360° azimuth 20° of zenith	22,000 m^2 @ 317.5 MHz	Linear at 317.5, 606 611, 834, 1420, 1667, 2380, and 4830 MHz; RHCP and LHCP at 74, 111, 196, 430, and 1420 MHz	430 and 2380 used for both radio and radar astronomy
			30.5 m equatorially mounted paraboloid (10.7 km NNE of 305 meter dish)	0^{o}-44^{o} declination; approx $\pm$ 22^{o} in hour angle. (The declination coverage limits are slightly dependent on the hour angle)	730 m^2	circular or linear in any orientation	Has a wide bandwith (apprx. 90 MHz) data link for data transmission to 305 m antenna. Used for both radio/radar interferometry.
TEXAS							
Harvard Radio Astronomy Station Fort Davis, Texas 30°38'08" N 103°56'42" W 1603 meters	Harvard Radio Astronomy Station Fort Davis, Texas 79734 (915) 426-3201 (Dr. A. Maxwell)	Harvard University under contract with USAF	1)26 m steerable paraboloid, 30 m	1)Full sky	1)230 m^2	1)Linear	
			2)8.5 m steerable paraboloid, 6 m	2)Full sky	2)40 m^2	2)Linear	
			3)Fixed broadside array	3)90°- 270° azimuth 30°- 90° elevation	3)7 m^2 @ 75 MHz 20 m^2 @ 40 MHz	3)Linear	
			4)Steerable log periodic	4)Full sky	4)300 m^2 @ 10 MHz 75 m^2 @ 20 MHz	4)Linear	
Millimeter Wave Observatory Mt. Locke Fort Davis, Texas 30°40' N 104°01' W 2070 meters	Electrical Engineering Research Laboratory The University of Texas at Austin Rt. 4, Box 189 Austin, Texas 78757 (512) 836-0440, Ext. 220 (Dr. J. R. Cogdell)	University of Texas, NASA and NSF	4.85 m paraboloid, polar mount, 6 m	Full Dec.	9.2 m^2 @ 140 GHz		
University of Texas Radio Astronomy Observatory Marfa, Texas 30°06'26" N 103°53'58" W 1450 meters	Department of Astronomy University of Texas Austin, Texas 78712 (512) 471-1098 (Dr. James N. Douglas)	University of Texas, NASA and NSF	1)16-element alt.-azimuth array, 5 m	1)Full sky	1)30 m^2	1)Helical Circular Right Hand	
			2)Synthesis interferometer consisting of five 300 m EW line arrays, 2 m	2)Meridian Transit -60° to +90° in Dec.	2)500 m^2	2)Helical Circular Right Hand	
			3)Decameter interferometer, 3-10 m	3)$\pm$3 hours H.A. $\pm$50° in Dec.	3)500-1000 m^2	3)Linear	
WEST VIRGINIA							
National Radio Astronomy Observatory Green Bank, West Virginia 38°26'08" N 79°49'42" W 825 meters	National Radio Astronomy Observatory P. O. Box 2 Green Bank, W. Va. 24944 (304) 456-2011 (James L. Dolan)	Associated Universities, Inc., under contract with NSF	1)91.4 m parabolic, 68.6 m	1)+86° to -20° in Dec.	1)3,620 m^2 @ 55% eff.	1)Variable	1)Transit telescope (moveable only in declination)
			2)42.7 m parabolic, 61 m	2)90° E to W 88° N 48° S	2)790 m^2 @ 55% eff.	2)Variable	2)Equatorial mount
			3)Three 25.9 m parabolic reflectors used as a 3-element interferometer	3)90° E to W 88° N 52° S	3)290 m^2 @ 55% eff.	3)Variable	

U.S. RADIO AND RADAR ASTRONOMY OBSERVATORIES IN FOREIGN COUNTRIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
AUSTRALIA							
Carnarvon, Australia 24°53' S 113°43' E	Space Environment Lab Environmental Research Laboratories NOAA Boulder, Colorado 80302 (303) 499-1000, Ext. 4211 (D.L. Hilliard)	NOAA/NASA	2.4 m paraboloid disk	210° x 80°	2.1 m^2	Linear	Solar flare patrol
NASA/JPL Deep Space Station Tidbinbilla, Australia 35°24'08" S 148°58'48" E 641.94 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	25.9 m paraboloid with Cass. feed, 35.1 m	H.A. +105° to -105° Dec. -20° to -90° H.A. decreases for Dec. +53° to -20°	300 m^2	RCP	Primary use in Deep Space Probe Tracking-RA secondary use
NASA/JPL Deep Space Station Woomera, Australia 31°22'59" N 136°53'10" E 151.56 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	25.9 m paraboloid with Cass. feed, 35.1 m	H.A. +90° to -90° Dec. +10° to -90° H.A. decreases for Dec. +48° to +10°	300 m^2 @ 57% eff.	RCP	Primary use in Deep Space Probe Tracking-RA secondary use
CANARY ISLANDS (SPAIN)							
Grand Canary Island 27°44' N 15°36' W 29 meters	Space Environment Lab. Environmental Research Laboratory NOAA Boulder, Colorado 80302 (303) 499-1000, Ext. 4211 (D.L. Hilliard)	NOAA/NASA	2.4 m paraboloid disk	210° x 80°	2.1 m^2	Linear	Solar flare patrol
CHILE							
Maipu Radio Astronomy Observatory Maipu, Chile 33°31' S 70°46' W	Observatorio Radio-astronomico De Maipu Universidad De Chile Casilla 68 Maipu, Chile (Sr. Jorge May) Operated jointly with the University of Florida Radio Observatory (904) 394-2052 (Dr. T. D. Carr)	University of Chile, University of Florida NSF	1)Three pairs of crossed Yagis, alt.-azimuth mounts 2)Two Yagis, equatorial mounts	1)Full sky 2)Full sky	1)350 m^2 @ 12 MHz, 250 m^2 @ 16.7 MHz, 170 m^2 @ 22.2 MHz 2)250 m^2 @ 18 MHz 130 m^2 @ 27.6 MHz	1)Circular or Linear 2)Linear	
SOUTH AFRICA							
NASA/JPL Deep Space Station Johannesburg, South Africa 25°53'21" S 27°41'09" E 1382 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	25.9 m paraboloid with Cass. feed, 35.1 m	H.A. +90° to -90° Dec. 0° to -90° H.A. decreases for Dec. -49° to 0°	300 m^2 @ 57% eff.	RCP	Primary use in Deep Space Probe Tracking-RA secondary use
SPAIN							
NASA/JPL Deep Space Station Ceberos, Spain 40°27'15" N 4°21'59" W 738.1 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	25.9 m paraboloid with Cass. feed, 35.1 m	H.A. -104° to +102° Dec. +13° to +90° H.A. decreases for Dec. -49° to +13°	300 m^2 @ 57% eff.	RCP	Primary use in Deep Space Probe Tracking-RA secondary use
NASA/JPL Deep Space Station Robledo, Spain 40°25'48" N 4°14'52" W 773.8 meters	Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, Calif. 91103 (213) 354-4321 (Donovan J. Spitzmesser)	JPL/CIT under contract with NASA	25.9 m paraboloid with Cass. feed, 35.1 m	H.A. -104° to +102° Dec. +13° to +90° H.A. decreases for Dec. -49° to +13°	300 m^2 @ 57% eff.	RCP	Primary use in Deep Space Probe Tracking-RA secondary use

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
ARIZONA									
NRAO Tucson 31°57'10" N 111°36'50" W	11-meter parabolic	Continuum	B	(15.375 GHz)	2 GHz	1000° K	24	Variable	Periodic scheduling
		Line and Continuum	B	22-24 GHz	100 MHz	300° K	24	Variable	Periodic scheduling
		Line	B	31-50 GHz	100 MHz	1300° K	24	Variable	Periodic scheduling
		Line	B	31.17 GHz	400 MHz	820° K	24	Variable	Periodic scheduling
		Continuum	B	31.4 GHz	400 MHz	1100° K	24	Variable	Periodic scheduling
		Line and Continuum	B	45.6 GHz	1000 MHz	150° K	24	Variable	Periodic scheduling
		Line and Continuum	B	47.5 GHz	200 MHz	150° K	24	Variable	Periodic scheduling
		Line and Continuum	B	67-85 GHz	100 MHz	2500° K	24	Variable	Periodic scheduling
		Line	B	67-101 GHz	1 GHz	4000° K	24	Variable	Periodic scheduling
		Line and Continuum	B	80-120 GHz	500 MHz	1000° K	24	Variable	Periodic scheduling
		Continuum	B	85 GHz	1 GHz	3000° K	24	Variable	Periodic scheduling
		Continuum	B	230 GHz	150 MHz	8000° K	24	Variable	Periodic scheduling
		Continuum	B	250 GHz	100 MHz	30,000° K	24	Variable	Periodic scheduling
CALIFORNIA									
Clark Lake Radio Observatory 33°20.3' N 116° 16.8'	1)Spiral helix antenna	Solar, galactic, and extragalactic sources	B	10-130 MHZ	3 MHz	1000° K above 80 MHz Galactic background below 80 MHz	24	71-Continuous	
	2)Phased array	Interplanetary scintillation	B	73.8 MHz	2 MHz	Galactic background	24	Continuous	
Hat Creek Radio Astronomy Station 40°49'03" N 121°28.4' W	1)26 m paraboloid	H, H_2CO and OH lines and Continuum	B	1420 MHz	16.6 MHz	200° K	24	Continuous	
			B	1600-1750 MHz	16.6 MHz	100° K	24	Continuous	
			B	4750-5250 MHz	16.6 MHz	50° K	24	Continuous	
	2)Interferometer	Many spectral lines and Continuum	B	18-40 GHz	1 GHz	600° K	24	Continuous	
			B	21-25 GHz	20 MHz	100° K	24	Continuous	
			B	112-117 GHz	200 MHz	1000° K	24	Continuous	
Space Radio Systems Facility El Segundo 33°54'52.56" N 118°22.5' W	4.57 paraboloid	Solar	A	90 GHz	3 GHz	7000° K	24	Continuous	
		Planetary	B	90 GHZ	3 GHz	7000° K	24	Continuous	
		Spectral lines	B	75-120 GHz	1 GHz	1000° K	24	Continuous	
NELC La Posta San Diego 32°40'39.3" N 116°26'06.4" W	1)18.3 parabola	Solar; Continuum	A	33 GHz (10-90 GHz)	2 GHz		13-03 GMT	Begin 1971	Solar Mapping, drive rates 1/10 sidereal to 6°/sec.
	2)2.44 m parabola	Solar; Continuum	A	2800 MHz	8 MHz		13-03 GMT	12/66-Con't	Solar flare patrol
	3)0.91 m parabola	Solar; Continuum	A	8800 MHz	25 MHz		13-03 GMT	10/68 Con't	Solar flare patrol
	4)Phased array	Interplanetary scintillation	B	73.8 MHz	2 MHz	Galactic background	24	Continuous	
Dawson Los Monos Reserve Carlsbad 33°9'00" N 117°15'22.5" W	1)phased array	Interplanetary scintillation	B	73.8 MHz	2 MHz	Galactic background	24	Continuous	

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
CALIFORNIA (con't)									
Owens Valley Radio Observatory 37°13.9' N 118°17.6' W	1)39.6 m paraboloid	VLB and Pulsars	A	220 MHz	2 MHz	160° K	24	Variable	The Owens Valley Radio Observatory maintains the capability of conducting observations at virtually any frequency between 100 MHz and 300 GHz
		VLB, Pulsars, Deuteinum	B	327 MHz	2 MHz	200° K	24	Variable	
	2)Two 27.4 m paraboloids	VLB and Pulsars	A	408 MHz	2 MHz	300° K	24	Variable	
		VLB and Continuum	B	570-610 MHz	1 kHz-30 MHz	300° K	24	Variable	
	3)3 10.4 m paraboloids	Line and Continuum	B	1350-1430 MHz	1 kHz-45 MHz	30° K	24	Variable	
		Line and Continuum	B	1610-1720 MHz	1 kHz-15 MHz	85° K	24	Variable	
		Continuum and Spacecraft	B	2240-2340 MHz	1 kHz-100 MHz	70° K	24	Variable	
		Line and Continuum	B	4800-5000 MHz	1 kHz-20 MHz	120° K	24	Variable	
		Cont. and Spacecraft	B	8300-8500 MHZ	1 kHz-200 MHz	150° K	24	Variable	
		Continuum	B	8085 MHz	45 MHz	90° K	24	Variable	
		Line and Continuum	B	10.2-11.2 GHz	1 kHz-400 MHz	65° K	24	Variable	
		Line and Continuum	B	18-24 GHz	1 kHz-50 MHz	100° K	24	Variable	
		Line and Continuum	B	42-44 GHz	1 kHz-500 MHz	1000° K	24	Variable	
		Line and Continuum	B	86-92 GHz	10 kHz-500 MHz	1500° K	24	Variable	
		Line and Continuum	B	110-120 GHz	10 kHz-500 MHz	1500° K	24	Variable	
		Line and Continuum	B	150-180 GHz	10 kHz-500 MHz	1500° K	24	Variable	
		Line and Continuum	B	230-260 GHz	10 kHz-500 MHz	300°/2000° K	24	Variable	
NASA/JPL Deep Space Communications Complex Goldstone 35°20' N 116°50' W	1)64 m paraboloid (Mars)	Very long baseline interferometer	B	2295 MHz	30 kHz	16° K	24	Variable	Periodic scheduling
		Pulsar observations	B	2295 MHz	6.8 MHz	16° K	24	Variable	Periodic scheduling
		Jupiter flux observations	B	2295 MHz	10 MHz	16° K	24	Variable	Periodic scheduling
		Lunar Occultation	B	2295 MHz	6.8 MHz	16° K	24	Variable	Periodic scheduling
		Phase sensitive interferometer	B	2388 MHz	400 kHz	22° K	24	Variable	Periodic scheduling
		Pulsar observations	B	2388 MHz	6.8 MHz	22° K	24	Variable	Periodic scheduling
		Very long baseline interferometer	B	7840 MHz	750 kHz	26° K	24	Variable	Periodic scheduling
				8427 MHz	750 kHz	26° K	24	Variable	Periodic scheduling
		Spectral line observation	B	(15.2 GHz)	10 MHz	50° K	24	Variable	Periodic scheduling
	2)25.9 m paraboloid (Venus)	Solar Occultation	B	2295 MHz	10 MHz	20° K	24	Variable	Periodic scheduling
		Pulsar observation	B	2388 MHz	6.8 MHz	20° K	24	Variable	Periodic scheduling
		Phase sensitive interferometer	B	2388 MHz	400 kHz	20° K	24	Variable	Periodic scheduling
	3)9.15 m paraboloid (Venus)	Venus/Jupiter observations	B	22 GHz	100 MHz	20,000° K	24	Variable	Periodic scheduling
	4)25.9 m paraboloid (Pioneer)	Very long baseline interferometer	B	2270-2300 MHz	30 kHz	30° K	24	Variable	Periodic scheduling
	5)25.9 m paraboloid (Echo)	Lunar and Solar Occultation, and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling
Table Mountain Observatory Wrightwood 34°22'34" N 117°04'51" W	5.49 m paraboloid 3.05 m paraboloid	Spatial distribution of thermal emission from the planets and the sun	B	36.0 GHz	400 MHz	700° K	24	Variable	Periodic scheduling

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
COLORADO									
Table Mountain Boulder 40°05'28" N 105°07'24" W	1)Quad 12-element Yagis	Solar	A	245 MHz	4 MHz	300° K	12-24 GMT	Continuous	Whole Sun Patrol
	2)Dual 17-element Yagis	Solar	A	410 MHz	2 MHz	300° K	12-24 GMT	Continuous	Whole Sun Patrol
	3)Quad 15-element Yagis	Solar	A	606 MHz	4 MHz	300° K	12-24 GMT	Continuous	Whole Sun Patrol
	4)2.4 m parabolic dish	Solar	A	1420 MHz 2700 MHz 4995 MHz	10 MHz 10 MHz 10 MHz		12-24 GMT	Continuous	Whole Sun Patrol
	5)2 m parabolic dish	Solar	A	8800 MHz	4 MHz		12-24 GMT	Variable	Whole Sun Patrol
Radio Astronomy Observatory University of Colorado 39°57' N 105°31' W	1)Steerable spectrographic interferometer	Solar and Jupiter	A	7.6-80 MHz	16-100 kHz	500-3000° K	16	1959-Continuous	
	2)Fixed arrays (interferometer)	Solar and Jupiter	A	9 MHz 18 MHz 36 MHz (74 MHz)	35 kHz 45 kHz 75 kHz 100 kHz	500° K 500° K 500° K 500° K	24 24 24 24	1949-Continuous 1949-Continuous 1949-Continuous	
	3)Polarimeter	Solar and Jupiter	A	24-37 MHz	40 kHz	1000° K	Periodic	1967-Continuous	
FLORIDA									
University of Florida Radio Observatory 29°32' N 83°02' W	1)5-element Yagi	Jupiter	A	15 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
		Jupiter	A	18 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
		Jupiter	A	20 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
		Jupiter	A	22.2 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
	2)7-element Yagi	Jupiter	A	27.6 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
	3)Crossed Yagis	Jupiter	A	18 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
	4)20-dipole array	Jupiter	A	20 MHz	4 kHz	Galactic	22-12 GMT	Continuous	
	5)640-dipole array	Jupiter	A	26.3 MHz	500 kHz	Galactic	22-12 GMT	Continuous	
HAWAII									
Palehua Observatory 21°25' N 158°5' W	2.44 m paraboloid	Solar patrol	B	1385.0 MHz	16 MHz	1000° K	Daylight	Continuous	Whole Sun patrol
			B	1435.0 MHz	16 MHz	1000° K	Daylight	Continuous	Quiet Sun and bursts
			B	8770.0 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	8830.0 MHz	16 MHz	1000° K	Daylight	Continuous	
			A	2695 MHz	8 MHz	1000° K	Daylight	Continuous	
			B	4965 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	5025 MHz	16 MHz	1000° K	Daylight	Continuous	
	8.5 m paraboloid	Solar patrol	A	245 MHz	2 MHz	1000° K	Daylight	Continuous	
			A	410 MHz	2 MHz	1000° K	Daylight	Continuous	
			A	610 MHz	2 MHz	1000° K	Daylight	Continuous	
	91 cm paraboloid	Solar patrol	B	15.35 GHz	20 MHz	1000° K	Daylight	Continuous	
			B	15.41 GHz	20 MHz	1000° K	Daylight	Continuous	
	2 element interferometer	Solar patrol	A	25-75 MHz	10 kHz	1500° K	Daylight	Continuous	

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Obeervatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
ILLINOIS									
Vermilion River Observatory 40°03'38" N 87°33'49" W	36.6 m paraboloid	Spectral line and Continuum (galactic and extragalactic)	B	1612-1720 MHz	20 MHz	120° K	24	7/70-Continuous	
		Continuum galactic and extragalactic	B	611 MHz	6 MHz	300° K	24	7/70-Continuous	
		Spectral line galactic	B	73-74.6 MHz	500 kHz	200° K	Sporadic	Variable	
				112 MHz					
				140 MHz					
				220 MHz					
				406 MHz	6 MHz	250° K	Variable	Variable	
				611 MHz	6 MHz	350° K	Variable	Variable	
				2215-2295 MHz	20 MHz	150° K	Variable	Variable	
				2695 MHz	10 MHz	250° K	Variable	Variable	
				4995 MHz	20 MHz	300° K	Variable	Variable	
IOWA									
North Liberty Radio Observatory 41°46'11" N 91°34'22" W	1)1.2 m cassegrain	Solar Patrol	A	15.375 GHz	20 MHz	2400° K	10-02 GMT	6/67-Continuous	
	2)Dual 5-element Yagis	Solar Burst	B	40 MHz	100 kHz	900° K	10-02 GMT	9/67-Continuous	
	3)16-element phase dipole array	Solar, Jupiter and galactic	A	26.3 MHz	6 kHz	300° K	24	6/70-Continuous	3) and 4) can be used as 300 meter baseline interferometer
	4)3-element Yagi	Solar, Jupiter and galactic	A	26.3 MHz	6 kHz	300° K	24	9/70-Continuous	
	5)18.3 m paraboloid	VLBI, Spectral Line	B	1610-1720 MHz	80 kHz	75° K	Variable	9/76-Continuous	None
MARYLAND/D.C.									
Maryland Point Observatory 38°22'26".69 N 77°13'51".14 W	1)25.9 m paraboloid	Continuum	B	(4.8 GHz)	500 MHz	23° K	24	Variable	Irregular scheduling
		Spectral line	B	8.4 GHz	15 MHz	70° K	24	Variable	Irregular scheduling
			B	10.7 GHz	30 MHz	100° K	24	Variable	Irregular scheduling
		VLBI	B	20-26 GHz	20 MHz	150° K	24	Variable	Irregular scheduling
			B	26-47 GHz	400 MHz	1300° K	24	Variable	Irregular scheduling
	2)25.6 m paraboloid	VLBI	B	120 MHz	1 MHz	500° K	24	Variable	
		H-line	B	1420 MHz	80 MHz	150° K	24	Variable	
		OH-line	B	(1612-1720 MHz)	80 MHz	150° K	24	Variable	
U.S. Naval Research Laboratory 38°49'17" N 77°14.0' W	15.2 m paraboloid								Used sporadically for radio astronomy ob-
University of Maryland Observatory 39°00' N 76°57' W	2-element interferometer	Solar	A	110 MHz	0.15 MHz	1000°K	6	9/79-Variable	Training of graduate students

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
MASSACHUSETTS									
George R. Agassiz Station 42°30'13" N 71°33.5' W	25.6 m paraboloid	Spectral lines	B	1420 MHz	80 MHz	100°K	24	Variable	
			B	1666 MHz	125 MHz	150°K	24	Variable	
			B	3100 MHz	400 MHz	300°K	24	Variable	
			B	4750 MHz	200 MHz	250°K	24	Variable	
			B	6050 MHz	200 MHz	200°K	24	Variable	
Five College Radio Astronomy Observatory 42°23'33.2" N 72°20'40.4" W	1)Four 37 m spherical reflectors 2)14 meter paraboloid in 20 m radome	Galactic, extra-galactic, planetary, continuum and spectral lines	B	73-74.6 MHZ	Various	250°K	24	6/70-Continuous	
			B	150-153 MHz	Various	250°K	24	6/70-Continuous	
			B	406-410 MHz	Various	250°K	24	6/70-Continuous	
			B	606-614 MHz 20-26 GHz 80-115 GHz	Various	250°K	24	6/70-Continuous	
Sagamore Hill Radio Observatory 42°37'54.36" N 70°49'15" W	1)25.6 m paraboloid	Radio stars and satellites	B	74 MHz	300 kHz	400° K	24	Variable	Periodic scheduling
			B	136 MHz	300 kHz	400° K	24	Variable	Periodic scheduling
			B	139 MHz	300 kHz	400° K	24	Variable	Periodic scheduling
			B	245 MHz	300 kHz	400° K	24	Variable	Periodic scheduling
			B	430 MHz	300 kHz	400° K	24	Variable	Periodic scheduling
	2)8.5 m paraboloid	Solar patrol	A	610 MHz	1 MHz	1000° K	24	Variable	Periodic scheduling
			A	1415 MHz	8 MHz	1000° K	24	Variable	Periodic scheduling
	3)8.5 m paraboloid	Solar patrol	A	245 MHz	1 MHz	1000° K	24	Variable	Periodic scheduling
			A	410 MHz	1 MHz	1000° K	24	Variable	Periodic scheduling
	4)2.44 m paraboloid	Solar patrol	B	2665 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
			B	2725 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
			B	4965 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
			B	5025 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
			B	8770 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
			B	8830 MHz	16 MHz	1000° K	24	Variable	Periodic scheduling
	5)91 cm paraboloid	Solar patrol	B	15.35 GHz	20 MHz	1000° K	24	Variable	Periodic scheduling
			B	15.41 GHz	20 MHz	1000° K	24	Variable	Periodic scheduling
	6)45 cm paraboloid	Solar patrol	B	34.94 GHz	20 MHz	3000° K	24	Variable	Periodic scheduling
			B	35.06 GHz	20 MHz	3000° K	24	Variable	Periodic scheduling
	7)3-element array	Solar polarization investigation	A	4995 MHz	20 MHz	1500° K	24	Variable	Periodic scheduling
	8)2-element interferometer	Solar patrol	A	25-75 MHz	10 kHz	1500° K	24	Variable	Periodic scheduling
Haystack Observatory 42°37'23" N 71°29'19" W	36 m paraboloid	OH-line and VLBI	B	1.6-1.75 GHz	20 MHz	200° K	24	Variable	Periodic scheduling
		VLBI only	B	2.3 GHz	100 MHz	150° K	24	Variable	Periodic scheduling
		Continuum Mapping Various Spectral Lines, and VLBI	B	7.5-8.7 GHz	150 MHz	75°K unswitched 100°K switched	24	Variable	Periodic scheduling
		Continuum Mapping, Various Spectral Lines, and VLBI	B	8.7-11.2 GHz	1 GHz at 10.0 GHz Decreasing to 100 MHz at Tuning Limits	80°K unswitched 120°K switched	24	Variable	Periodic scheduling
		VLBI only	B	14.7 GHz	50 MHz	400° K	24	Variable	Periodic scheduling
		Continuum Mapping and Flux Measurements	B	15.5 GHz	1.2 GHz	900° K	24	Variable	Periodic scheduling
		Continuum Mapping; H_2O, NH_3 and other Spectral Lines; and VLBI	B	21-26 GHz	200 MHz	100° K	24	Variable	Periodic scheduling
		SiO Spectral-Lines and VLBI	B	42-44 GHz	400 MHz	900° K double sideband	24	Variable	Periodic scheduling

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
MICHIGAN									
University of Michigan Radio Astronomy Observatory 42°23'55.9" N 83°56'10.5" W	25.9 m Paraboloid	Continuum, linear & Circular polarization. Variable sources & sky survey	A & B	4.8 GHz	0.55 GHz	80°K	24	Continuous	Cryogenic Parametric Amplifier
		Continuum, linear & Circular Polarization. Variable sources, sky survey	A & B	8.0 GHz	0.72 GHz	180°K	24	Continuous	
		Continuum linear Polarization, Variable sources	B	14.5 GHz	1.70 GHz	900°K	24	Continuous	
NEW JERSEY									
Bell Laboratories, Crawford Hill 40°23'31" N 74°11'15" W	1)7 m paraboloid	Line	B	70-90 GHz	512 MHz	350° K	24	Variable	
		Line	B	90-140 GHz	512 MHz	150° K	24	Variable	
		Line	B	200-230 GHz	512 MHz	700° K	24	Variable	
		Line	B				24	Variable	
		Line	B				24	Variable	
		Continuum	B	(100-150 GHz)	800 MHz		24	Variable	
	2)6.1 m horn reflector	Line	B	1.4 GHz	5 MHz	40° K	24	Variable	
NEW MEXICO									
National Radio Astronomy Observatory, Very Large Array. 52 miles West of Socorro, N.M. between Magdalena, N.M. and Datil, N.M. on Highway 60. 34°04'43" N 107°37'04" W	Very Large Array. 27 element interferometer array, each element fully Steerrable, 25 meter dia. paraboloid arranged in a 120° Wye, with legs of 21, 21, & 18.9 km.	Continuum and Spectral line synthesis	B	1340-1730 MHz 4500-5000 MHz 14.4-15.4 GHz 22.0-24.0 GHz	50 MHz 50 MHz 50 MHz 50 MHz	50° K 50° K 300° K 400° K	24	Quarterly Scheduling	Now operating 50% of the time with 12 antennas. Planned operation: 1/79 - 16 antennas 1/80 - 22 antennas
OHIO									
Ohio State-Ohio Wesleyan Radio Observatory	103.8 x 21.4 m standing parabola	Broadband	B	221-223 MHz			24	Continuous	
		Continuum	B	612 MHz	8 MHz	140°K	24	1961-Continuous	
		Mapping	B	1415 MHz	8 MHz	95°K	24	1961-Continuous	
				2650 MHz	100 MHz	140°K	24	1967-Continuous	
				15 MHz	2.8 MHz	100°K	24	1971-Continuous	
				1400-1700 MHz	10 MHz		24	Continuous	

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
PUERTO RICO									
Arecibo Observatory 18°21' 13" N 66°45'11" W	305 m spherical reflector	Pulsar, Continuum	A	46.5 MHz	0.5 MHz	1000°K	Variable	Variable	
		Pulsar, Continuum, Spectra	A	70-500 MHz	-	400°K	Variable	Variable	Broadband Log Periodic
			A	73.8 MHz	0.5 MHz	3000°K	Variable	Variable	
			A	111.5 MHz	0.5 MHz	1000°K	Variable	Variable	
			A	196.5 MHz	0.5 MHz	500°K	Variable	Variable	
			B	317.5 MHz	3.0 MHz	200°K	Variable	Variable	
			B	430.0 MHz	8.0 MHz	110°K	Variable	Variable	Ionospheric Radar
			B	510.0 MHz	40.0 MHz	100°K	Variable	Variable	
			B	606.0 MHz	40.0 MHz	100°K	Variable	Variable	
			B	760.0 MHz	40.0 MHz	100°K	Variable	Variable	
			B	834.0 MHz	100.0 MHz	100°K	Variable	Variable	
			B	932.0 MHz	100.0 MHz	60°K	Variable	Variable	
			B	1032.0 MHz	100.0 MHz	70°K	Variable	Variable	
			B	1120.0 MHz	100.0 MHz	70°K	Variable	Variable	
			B	1220.0 MHz	100.0 MHz	70°K	Variable	Variable	
			B	1320.0 MHz	100.0 MHz	70°K	Variable	Variable	
			B	1380.0 MHz	100.0 MHz	40°K	Variable	Variable	
			B	1660.0 MHz	100.0 MHz	60°K	Variable	Variable	
			B	2380.0 MHz	40.0 MHz	30°K	Variable	Variable	Planetary Radar
			B	4830.0 MHz	200.0 MHz	100°K	Variable	Variable	
	30.5 m equatorially Mounted paraboloid	Interferometry	B	2380.0 MHz (1420 MHz)	20.0 MHz	40°K	Variable	Variable	Multi-frequency operation is being developed. System came on line in January 1979.

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
TEXAS									
Harvard Radio Astronomy Station Fort Davis 30°38'08" N 103°56'42" W	1)26 m paraboloid	Solar	A	550-1000 MHz	5 MHz	2300° K	12-02 GMT	2/70-3/74	Now on standby
		Solar	A	1100-2000 MHz	5 MHz	2500° K	12-02 GMT	2/70-3/74	Now on standby
		Solar	A	2000-4000 MHz	5 MHz	2500° K	12-02 GMT	1/72-3/74	Now on standby
		Extragalactic	B	606 MHz	2-20 MHz	300° K	24	12/73-Periodic	VLBI
		Extragalactic	B	1665 MHz	2-100 MHz	130° K	24	5/76-Periodic	
		Extragalactic	B	5010 MHz	2-30 MHz	250° K	24	4/72-Periodic	VLBI
		Extragalactic	B	10.7 GHz	2-30 MHz	250° K	24	5/72-Periodic	VLBI
	2)8.5 m paraboloid	Solar	A	100-180 MHz	300 kHz	1100° K	12-02 GMT	10/56-Continuous	
		Solar	A	180-320 MHz	500 kHz	1400° K	12-02 GMT	10/56-Continuous	
		Solar	A	320-580 MHz	1 MHz	1800° K	12-02 GMT	10/56-Continuous	
	3)Fixed array	Solar	A	25-50 MHz	100 kHz	900° K	12-02 GMT	1/59-Continuous	
		Solar	A	50-100 MHz	200 kHz	600° K	12-02 GMT	1/59-Continuous	
	4)Log periodic	Solar	A	10-25 MHz	100 kHz	1100° K	12-02 GMT	1/67-3/74	Now on standby
Millimeter Wave Observatory Mt. Locke 30°40' N 104°01' W	4.85 m paraboloid	Lunar	B	15 GHz	2 GHz	500° K	24	Continuous	
		Solar	A	35 GHz	2 GHz	3000° K	24	Continuous	
		Line		75 GHz	100 MHz				
		Line	B	85-150 GHz	3 GHz	1000° K	24	Continuous	
		Planetary	B	95 GHz	2 GHz	1500° K	24	Continuous	
		Galactic	B	140 GHz	2 GHz	1500° K	24	Continuous	
University of Texas Radio Astronomy Observatory 30°06'26" N 103°53'58" W	1)16-element array	Lunar Occultation	B	330 MHz	30 MHz	200° K	24	3/69-Variable	
			B	365 MHz	30 MHz	200° K	24	3/69-Variable	
			B	400 MHz	30 MHz	200° K	24	3/69-Variable	
	2)Synthesis interferometer	Extragalactic	B	(330 MHz)	30 MHz	200° K	00-12 UT	1/70-Continuous	
			B	365 MHz	30 MHz	200° K	00-12 UT	1/70-Continuous	
			B	(400 MHz)	30 MHz	200° K	00-12 UT	1/70-Continuous	
	3)Decameter interferometer	Planetary	A	10.05 MHz	3 kHz	300,000° K	8	66-Continuous	Synoptic Monitoring of Jupiter
			A	16.70 MHz	13 kHz	100,000° K	8	66-Continuous	
			A	20.05 MHz	13 kHz	70,000° K	8	66-Continuous	
			A	22.20 MHz	13 kHz	50,000° K	8	66-Continuous	
			A	30.03 MHz	100 kHz	10,000° K	8	66-Continuous	

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SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By State and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
WEST VIRGINIA									
NRAO/Green Bank 38°26'08" N 79° 49'42" W	1)91.4 m paraboloid	Pulsar & Continuum	B	50-80 MHz	5 MHz	500° K	24	Variable	Periodic scheduling
		Pulsar & Continuum	B	110-250 MHz	140 MHz	250° K	24	Variable	Periodic scheduling
		Pulsar & Continuum	B	250-500 MHz	250 MHz	300° K	24	Variable	Periodic scheduling
		Line & Continuum	B	500-740 MHz	20-40 MHz	150° K	24	Variable	Periodic scheduling
		Line & Continuum	B	740-1000 MHz	20-40 MHz	150° K	24	Variable	Periodic scheduling
		Line	B	1000-1450 MHz	200 MHz	50° K	24	Variable	Periodic scheduling
		Continuum	B	1400 MHz	60 MHz	120° K	24	Variable	Periodic scheduling
		Line	B	1610-1720 MHz	25 MHz	70° K	24	Variable	Periodic scheduling
		Continuum	B	2695 MHz	100 MHz	120° K	24	Variable	Periodic scheduling
		Line & Continuum	B	3120-3370 MHz	250 MHz	60° L	24	Variable	Periodic scheduling
		Line & Continuum	B	4500-5100 MHz	600 MHz	70° K	24	Variable	Periodic scheduling
		Line & Continuum	B	300-1000 MHz	25 MHz	50° K	24	Variable	Periodic scheduling
	2)42.7 m	Pulsar & Continuum	B	50-80 MHz	5 MHz	500° K	24	Variable	Periodic scheduling
		Pulsar & Continuum	B	110-250 MHz	140 MHz	500° K	24	Variable	Periodic scheduling
		Pulsar & Continuum	B	250-500 MHz	250 MHz	250° K	24	Variable	Periodic scheduling
		Line & Continuum	B	500-740 MHz	20-40 MHz	150° K	24	Variable	Periodic scheduling
		Line & Continuum	B	740-1000 MHz	20-40 MHz	150° K	24	Variable	Periodic scheduling
		Line	B	1000-1450 MHz	200 MHz	50° K	24	Variable	Periodic scheduling
		Continuum	B	1400 MHz	60 MHz	120° K	24	Variable	Periodic scheduling
		Line	B	1350-1750 MHz	300 MHz	70° K	24	Variable	Periodic scheduling
		Line	B	1610-1720 MHz	25 MHz	70° K	24	Variable	Periodic scheduling
		Line & Continuum	B	3120-3370 MHz	250 MHz	60° K	24	Variable	Periodic scheduling
		Line & Continuum	B	4500-5100 MHz	600 MHz	70° K	24	Variable	Periodic scheduling
		Line	B	6035 MHz	130 MHz	90° K	24	Variable	Periodic scheduling
		Line & Continuum	B	8200-8500 MHz	125 MHz	70° K	24	Variable	Periodic scheduling
		Line	B	5.2-10.4 GHz	40 MHz	400° K	24	Variable	Periodic scheduling
		Line & Continuum	B	10.3-11.0 GHz	300 MHz	70° K	24	Variable	Periodic scheduling
		Line & Continuum	B	14.4-14.9 GHz	420 MHz	120° K	24	Variable	Periodic scheduling
		Line & Continuum	B	8.0-26.6 GHz	350 MHz	50° K	24	Variable	Periodic scheduling
	3)1-13.7 m and 3-25.9 m paraboloids interferometer	Line & Continuum	B	1420 MHz	30 MHz	120° K	24	Variable	Periodic scheduling
		Continuum	B	2695 MHz	70 MHz	120° K	24	Variable	Periodic scheduling
		Continuum	B	8085 MHz	70 MHz	120° K	24	Variable	Periodic scheduling

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(By Country and Observatory)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
AUSTRALIA									
Carnarvon 24° 53' S 113°43' E	2.4 m parabolic dish	Solar	A A A	1.5 GHz 2.7 GHz 5.0 GHz	16 MHz 16 MHz 16 MHz		22-10 GMT 22-10 GMT 22-10 GMT	1967-Continuous 1967-Continuous 1967-Continuous	
NAS/JPL Deep Space Station Tidbinbilla 35°24'08" S 148°58'48" E	25.9 m paraboloid	Very long baseline interferometer	B	2270-2300 MHz	30 kHz	30° K	24	Variable	Periodic scheduling
		Lunar and Solar Occultation and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling
NASA/JPL Deep Space Station Woomera 31°22'59" N 136°53'10" E	25.9 m paraboloid	Very long baseline interferometer	B	2270-2300 MHz	30 khz	30° K	24	Variable	Periodic scheduling
		Lunar and Solar Occultation and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling
CANARY ISLANDS (SPAIN)									
Grand Canary Island 27°44' N 15°36' W	2.4 m parabolic dish	Solar	A A A	1.5 GHz 2.7 GHz 5.0 GHz	16 MHz 16 MHz 16 MHz		07-19 GMT 07-19 GMT 07-19 GMT	1967-Continuous 1967-Continuous 1967-Continuous	Whole-sun patrol Whole-sun patrol Whole-sun patrol
CHILE									
Maipu Radio Astronomy Observatory 33°31' S 70°46' W	1)Crossed Yagis	Jupiter Jupiter Jupiter	A A A	12 MHz 16.7 MHz 22.2 MHz	4 kHz 4 kHz 4 kHz	Galactic Galactic Galactic	21-11 GMT 21-11 GMT 21-11 GMT	Continuous Continuous Continuous	
	2)Yagis	Jupiter	A A	18 MHz 27.6 MHz	4 kHz 4 kHz	Galactic Galactic	21-11 GMT 21-11 GMT	Continuous Continuous	
SOUTH AFRICA									
NASA/JPL Deep Space Station Johannesburg 25°53'21" S 27°41'09" E	25.9 m paraboloid	Very long baseline interferometer	B	2270-2300 MHz	30 kHz	30° K	24	Variable	Periodic scheduling
		Lunar and Solar Occultation and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling
SPAIN									
NASA/JPL Deep Space Station Ceberos 40°25'48" N 4°14'52" W	25.9 m paraboloid	Very long baseline interferometer	B	2270-2300 MHz	30 kHz	30° K	24	Variable	Periodic scheduling
		Lunar and Solar Occultation and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling
NASA/JPL Deep Space Station Robledo 40°25'48" N 4°14'52" W	25.9 m paraboloid	Very long baseline interferometer	B	2270-2300 MHz	30 kHz	30° K	24	Variable	Periodic scheduling
		Lunar and Solar Occultation and source intensity measurements	B	2270-2300 MHz	6.8 MHz	30° K	24	Variable	Periodic scheduling

* Frequencies not presently being used but planned for future use are in ( ).

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Frequencies by Octaves)

Observatory	Frequencies*
6,400 - 12,800 kHz	
U Colorado	7,550-12,800
Clark Lake	8,500-12,800
Fort Davis	9,950-12,800
U. Texas	10,048-10,052
Maipu	11,998-12,002
12,800 - 25,600 kHz	
U. Colorado	12,800-25,600
Fort Davis	12,800-25,600
Clark Lake	12,800-25,600
U. Florida	14,998-15,002
U. Texas	16,693-16,707
Maipu	16,698-16,702
Maipu	17,998-18,002
U. Florida	17,998-18,002
U. Florida	19,998-20,002
U. Texas	20,043-20,059
U. Texas	22,193-22,207
Maipu	22,198-22,202
U. Florida	22,198-22,202
Sagamore Hill	24,995-25,600
25.6 - 51.2 MHz	
U. Colorado	25.6 - 51.2
Fort Davis	25.6 - 51.2
Clark Lake	25.6 - 51.2
Sagamore Hill	25.6 - 51.2
Palehua	25.6 - 75.005
U. Florida	26.05 - 26.55
North Liberty	26.297 - 26.303
Maipu	27.598 - 27.602
U. Florida	27.598 - 26.602
U. Texas	29.980 - 30.080
North Liberty	39.95 - 40.05
Green Bank	47.5 - 51.2
Arecibo	46.25 - 46.75
51.2 - 102.4 MHz	
U. Colorado	51.2 - 80.05
Fort Davis	51.2 - 102.4
Clark Lake	51.2 - 102.4
Greenbank	51.2 - 102.4
Sagamore Hill	51.2 - 75.005
Five College	72.0 - 75.6
La Posta	72.8 - 74.8
Carlsbad	72.8 - 74.8
Vermilion	73.0 - 74.6
Arecibo	70.0 - 102.4
U. Michigan	99.5 - 102.4

Observatory	Frequencies*
102.4 - 204.8 MHz	
Fort Davis	102.4 - 204.8
Clark Lake	102.4 - 131.5
Green Bank	102.4 - 204.8
U. Michigan	102.4 - 204.8
Arecibo	102.4 - 204.8
U. Maryland	109.925 -110.075
Vermilion	111.75 - 112.25
Maryland Pt.	119.5 - 120.5
Sagamore Hill	135.85 - 136.15
Sagamore Hill	138.85 - 139.15
Vermilion	139.75 - 140.25
Five College	149.0 - 154.0
204.8 - 409.6 MHz	
Fort Davis	204.8 - 409.6
Green Bank	204.8 - 409.6
U. Michigan	204.8 - 409.6
Owens Valley	219.0 - 221.0
Vermilion	219.75 - 220.25
Ohio	221.0 - 223.0
Boulder	243.0 - 247.0
Palehua	244.0 - 246.0
Sagamore Hill	244.5 - 245.5
U. Texas	315.0 - 345.0
Arecibo	204.8 - 409.6
Owens Valley	326.0 - 328.0
U. Texas	350.0 - 380.0
U. Texas	385.0 - 415.0
Vermilion	403.0 - 409.0
Cornell	404.0 - 412.0
Five College	405.5 - 409.6
Owens Valley	407.0 - 409.0
Boulder	509.0 - 409.6
Palehau	409.0 - 409.6
Sagamore Hill	409.5 - 409.6

Observatory	Frequencies*
409.6 - 819.2 MHz	
Boulder	409.6 - 411.0
Fort Davis	409.6 - 819.2
Green Bank	409.6 - 819.2
U. Michigan	409.6 - 580.5
Sagamore Hill	409.6 - 410.5
Five College	409.6 - 411.0
Cornell	426.0 - 434.0
Arecibo	409.6 - 530.0
Sagamore Hill	429.85 - 430.15
Owens Valley	555.0 - 625.0
Fort Davis	596.0 - 616.0
Arecibo	586.0 - 626.0
Boulder	604.0 - 608.0
Five College	605.0 - 615.0
Cornell	607.0 - 615.0
Vermilion	608.0 - 614.0
Ohio	608.0 - 616.0
Palehua	609.0 - 611.0
Sagamore Hill	609.5 - 610.5
Arecibo	740.0 - 780.0
Arecibo	780.0 - 819.2
819.2 - 1638.4 MHz	
Green Bank	819.2 - 1638.4
Fort Davis	819.2 - 1002.5
Arecibo	819.2 - 1430.0
Fort Davis	1097.5 - 1638.4
Socorro	1315.0 - 1755.0
Owens Valley	1328.5 - 1452.5
Palehua	1377.0 - 1393.0
Maryland Pt.	1380.0 - 1460.0
G.R. Agassiz	1380.0 - 1460.0
Crawford Hill	1397.5 - 1402.5
Ohio	1399.005-1638.4
Sagamore Hill	1411.0 - 1419.0
Ohio	1411.0 - 1419.0
Hat Creek	1411.7 - 1428.3
Boulder	1415.0 - 1425.0
Cornell	1416.0 - 1424.0
Palehua	1427.0 - 1443.0
Carnarvon	1492.0 - 1508.0
North Liberty	1570.0 - 1638.4
Grand Canary	1492.0 - 1508.0
Maryland Pt.	1572.0 - 1760.0
Haystack	1590.0 - 1638.4
Hat Creek	1591.0 - 1638.4
Vermilion	1602.0 - 1638.4
Owens Valley	1603.5 - 1638.4
G.R. Agassiz	1603.5 - 1638.4
Arecibo	1610.0 - 1638.4

Observatory	Frequencies*
1638.4 - 3276.8 MHz	
Fort Davis	1638.4 - 3276.8
Ohio	1638.4 - 1700.005
Vermilion	1638.4 - 1730.0
North Liberty	1638.4 - 1760.0
Green Bank	1638.4 - 1900.0
Maryland Pt.	1638.4 - 1760
Owens Valley	1638.4 - 1727.5
Hat Creek	1638.4 - 1758.3
R.G. Agassiz	1638.4 - 1728.5
Haystack	1638.4 - 1760.0
Arecibo	1638.4 - 1710.0
Cornell	1663.0 - 1671.0
Owens Valley	2190.0 - 2390.0
Haystack	2250.0 - 2350.0
Goldstone	2266.6 - 2303.4
Tidbinbilla	2266.6 - 2303.4
Woomera	2266.6 - 2303.4
Johannesburg	2266.6 - 2303.4
Caberos	2266.6 - 2303.4
Roblado	2266.6 - 2303.4
Vermilion	2205.0 - 2305.0
Arecibo	2360.0 - 2400.0
Goldatone	2384.6 - 2391.4
Ohio	2600.0 - 2700.0
Green Bank	2645.0 - 2745.0
Sagamore Hill	2657.0 - 2673.0
Vermilion	2690.0 - 2700.0
Carnarvon	2692.0 - 2708.0
Grand Canary	2692.0 - 2708.0
Boulder	2695.0 - 2705.0
Cornell	2696.0 - 2704.0
Sagamore Hill	2717.0 - 2735.0
La Posta	2796.0 - 2804.0
G.R. Agassiz	2900.0 - 3276.8
Green Bank	2995.0 - 3276.8
3276.8 - 6553.6 MHz	
Fort Davis	3276.8 - 4002.5
Green Bank	3276.8 - 3495.0
G.R. Agassiz	3276.8 - 3300.0
Green Bank	4200.0 - 6553.6
Socorro	4473.0 - 5025.0
U. Michigan	4525.0 - 5075.0
Maryland Pt.	4550.0 - 5050.0
Michigan	4550.0 - 5050.0
G.R. Agassiz	4650.0 - 4850.0
Hat Creek	4741.7 - 5258.3
Arecibo	4730.0 - 4930.0
Sagamore Hill	4957.0 - 4973.0
Vermilion	4985.0 - 5005.0
Owens Valley	4790.0 - 5010.0
Boulder	4990.0 - 5000.0
Carnarvon	4992.0 - 5008.0
Grand Canary	4992.0 - 5008.0
Fort Davis	4995.0 - 5025.0
Sagamore Hill	5017.0 - 5023.0
G.R. Agassiz	5950.0 - 6150.0

* Frequency bands listed are principal frequencies plus bandwidth being observed. See Observatory List for more detailed information.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Frequencies by Octaves)

Observatory	Frequencies*
6.5536 - 13.1072 GHz	
Green Bank	6.5536 -13.1072
Haystack	7.425 - 8.755
U. Michigan	7.64 - 8.36
Goldstone	7.8396 - 7.8404
Owens Valley	8.0625 - 8.1075
Owens Valley	8.2 - 8.6
Maryland Pt.	8.3925 - 8.4075
Goldstone	8.4266 - 8.4274
Haystack	8.65 - 11.25
Palehua	8.762 - 8.778
Sagamore Hill	8.762 - 8.778
La Posta	8.7875 - 8.125
Owens Valley	10.0 - 11.4
Boulder	8.798 - 8.802
Palehua	8.822 - 8.838
Sagamore Hill	8.822 - 8.838
La Posta	9.0 - 13.1072
Maryland Pt.	10.685 - 10.715
Fort Davis	10.685 - 10.715
Owens Valley	12.65 - 13.1072
13.1072 - 26.2144 GHz	
Green Bank	13.1072 - 26.2144
La Posta	13.1072 - 26.2144
U. Michigan	13.1072 - 15.35
Haystack	13.675 - 14.725
Mt. Locke	14.0 - 16.0
Greenbank	14.9 - 15.11
Socorro	21.975 - 24.025
Tucson	14.375 - 16.375
Haystack	14.9 - 16.1
Goldstone	15.195 - 15.205
Sagamore Hill	15.34 - 15.36
Palehua	15.34 - 15.42
North Liberty	15.365 - 15.385
Sagamore Hill	15.40 - 15.42
Palehua	15.4 - 15.42
Hat Creek	17.5 - 26.2144
Owens Valley	17.975 - 24.025
Green Bank	19.95 - 24.25
Maryland Pt.	19.99 - 26.2144
Five College	20.0 - 26.0
Haystack	20.9 - 26.1
Goldstone	21.95 - 22.05
Tucson	21.95 - 22.05
Socorro	21.975 - 24.025

Observatory	Frequencies*
26.2144 - 52.4288 GHz	
Green Bank	26.2144 - 26.725
Hat Creek	26.2144 - 40.5
La Posta	26.2144 - 52.4288
Maryland Pt.	26.2144 - 47.2
Wrightwood	35.86 - 36.26
Tucson	30.95 - 50.05
Mt. Locke	34.0 - 36.0
Sagamore Hill	34.939 - 34.941
Sagamore Hill	35.059 - 35.061
Haystack	41.8 - 44.2
Owens Valley	41.75 - 44.25
Tucson	47.4 - 47.6
Crawford Hill	49.95 - 52.4288
52.4288 - 104.8576 GHz	
La Posta	52.4288 - 91.0
Crawford Hill	42.4288 - 104.8576
Tucson	65.93 - 104.8576
El Segundo	74.5 - 104.8576
Mt. Locke	74.95 - 75.05
Five College	80.0 - 104.8576
Owens Valley	85.75 - 92.25
Mt. Locke	94.0 - 96.0
104.8576 - 209.7152 GHz	
Five College	104.8576 - 115.0
Tucson	104.8576 - 120.05
El Segundo	104.8576 - 121.5
Crawford Hill	104.8576 - 140.256
Hat Creek	111.9 - 117.1
Owens Valley	109.75 - 120.25
Mt. Locke	139.0 - 141.0
Owens Valley	149.75 - 180.25
Crawford Hill	199.744 - 209.7152
209.7162 - 300 GHz	
Crawford Hill	209.7152 - 230.257
Tucson	229.925 - 230.075
Tucson	249.95 - 250.05
Owens Valley	229.75 - 260.25

Observatory	Frequencies*

Observatory	Frequencies*

* Frequency bands listed are principal frequencies plus bandwidth being observed. See Observatory List for more detailed information.

FREQUENCIES BEING USED FOR RADAR ASTRONOMY OBSERVATIONS

(By State and Obeservatory)

Name and Location	Telescope	Type of Observation	Class of Emission	Frequency*	Bandwidth	Power	Hours of Reception	Dates of Operation	Remarks
CALIFORNIA									
NASA/JPL Deep Space Communications Complex Goldstone 35°20' N 116°50' W	1)64 m paraboloid (Mars)	Planetary	F9	2388 MHz	500 kHz	450 Kw	24	Variable	Periodic scheduling
	2)25.9 m paraboloid (Venus	Planetary	F9	2388 MHz	500 kHz	450 Kw	24	Variable	Periodic scheduling
Stanford Center for Radar Astronomy 37°24'31" N 122°10'42" W	45.7 m paraboloid	Bistatic-radar	F9 & CW	259.7 MHz	20 kHz		24	During Apollo Flights	Reception of surface reflected signals transmitted by Apollo CSM
Puerto Rico									
Arecibo Observatory 18°21'13" N 66°45'11" W	305 m spherical reflector	Planetary radar	P9	430 MHz	1 MHz	150 Kw Average	Variable	Variable	Pulse, including Phase-Reversal Pseudorandom Code
		Planetary radar	P9 & CW	2380 MHz	40 MHz	500 Kw Average	Variable	Variable	Modulation: CW or Phase-Reversal Pseudorandom Code
	30.5 m equatorially mounted paraboloid	Planetary radar	-	2380 MHz	40 MHz	-	Variable	Variable	Passive element of a radar interferometer

* Frequencies not presently being used but planned for future use are in ( ).

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES

Source of Information Indicated in Remarks:

1. Operating Administrations,
2. ITU List of Stations in the Space Service and in the Radio Astronomy Service, 3rd Edition, 1 May 1971,
3. Summary of Details of Radioastronomy Observatories Reported to IUCAF up to 31 July 1971, Table I in Document IUCAF/179,
4. American Ephemeris and Nautical Almanac, 1973, pp. 502-505, List of Radio Observatories,
5. Ground-Based Astronomy, A Ten-Year Program, NAS-NRC, 1964,
6. Scientific Journals and/or Reports from Scientists.

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
ARGENTINA							
Radio Observatory La Plata, Argentina	Instituto Argentino de Radioastronomia Casitla de Correo #5 Villa Elisa (Pcia. de Bs. As.) Argentina	Argentine NRC	Two 30 m paraboloid, limited steerability				Sources - (5,6)
AUSTRALIA							
Radio Astronomy Observatory Bothwell, Tasmania 42°18' S 147°02' E	CSIRO Hobart, Tasmania	CSIRO	Circular filled-in array, diameter 1097.3 m	Beam 8° diameter adjustable in N-zenith-S plane			Sources-(2,3)
CSIRO Solar Radio Observatory Culgoora, NSW 30°19.3' S 149°34.3' E	CSIRO Division of Radiophysics P.O. Box 76 EPPING, 2121 N.S.W.	CSIRO	1)Radioheliograph, with circular arrays 3 km in diameter, 96 steerable paraboloids; 48 corner-reflector aerials 2)Radiospectrograph	1)H.A. -45° to +45° Dec. -42° to +42° 2)H.A. $\pm$90° Dec. $\pm$	1)6000 m^2 @ 80, 160 and 327.4 MHz 1000 m^2 @ 43.25MHz 2)From ~250 m^2 at 8 MHz to 1.3 m^2 at 2000-8000 MHz	L.H. and R.H. Circular	Sources-(1) Scheduled to cease operations in 1984
CSIRO Radio Astronomy Observatory Epping, NSW 33°46'.36" S 151°06'.07" E	CSIRO Division of Radiophysics P.O. Box 76 EPPING, 2121 N.S.W.	CSIRO	4 m steerable paraboloid	All azimuths 0°-90° elevation	12.6 m^2		
Radio Astronomy Observatory Fleurs, NSW 33°51'S 150°46' E	School of Electrical Engineering University of Sydney Sydney, N.S.W. (Dr. W.N. Christiansen)	University of Sydney	1)Rotational synthesis telescope. 64 x 6 m, 4 x 14 m paraboloids, 800 m E-W and 800 m N-S 2)Compound interferometer 800 m E-W 3)Grating Cross 4)Cross. 914 m arms				
Molonglo Radio Observatory Hoskintown, NSW 35°22' S 149°25' E	School of Physics University of Sydney, N.S.W. 2006	Univ. of Sydney Australian Res. Grants Committee	EW Cylindrical parabola, multiple fan beam 1.6 km x 12 m	Effectively Alt-Alt dec. +18° to -90° EW $\pm$ 60°	12,000 sq m	Circular	Sources-(1)
Australian National Radio Astronomy Observatory Parkes, NSW 33°00.0' S 148°15.7' E 392 meters	CSIRO Division of Radiophysics P.O. Box 76 EPPING, 2121 N.S.W.	CSIRO	1)64 m steerable paraboloid 2)Interferometer consisting of one 64 m and one 18.3 m steerable paraboloids	1)All azimuths, 30°- 90° elevation 2)All azimuths, 30°- 90° elevation	1)1770 m^2 2)1920 m^2		Sources-(1) Periodic Scheduling
Llanherne Radio Astronomy Observatory Hobart, Tasmania 42°50.6' S 147°29.6' E 0 meters	Department of Physics University of Tasmania Box 252C, G.P.O. Hobart, Tasmania Australia 7001 (Dr. P. A. Hamilton)	University of Tasmania, Radio Research Board, Australian Research Grants Committee	1)760 m diameter circular filled aperture broadband dipole array 2-20 MHz 2)80 m(NS) x 160 m(EW) rectangular filled aperture broadband dipole array 40-180 MHz 3)13.5 m paraboloid, equatorial mount	1)Meridian transit, multiple beams steerable from dec. -90° to +10° 2)Meridian transit, steerable from dec. -90° to +20° 3)300°- 60° azimuth 0°- 90° elevation	1)450,000 m^2 2)12,800 m^2 3)100 m^2		Sources-(1)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
BELGIUM							
Humain Station Observatoire Royal de Belgique Humain, Belgium 50°11.5' N 5°15.3' E 293 meters	Observatoire Royal de Belgique c/o Regie des telegraphes et des telephone 42 rue des Palais Bruxelles III Belgium	Observatoire Royal de Belgique	1)6 m paraboloid 2)7.5 m paraboloid 3)Interferometer consisting of forty-eight 4 m paraboloids; 32 in E-W line, 16 in N-S line, 20 m spacing	1)90°- 270° azimuth 0°- 70° elevation 2)Full sky 3)45°- 315° azimuth 0°- 70° elevation	1)20 m^2 2)27 m^2 3)10 m^2		Sources-(2,4,5)
BRAZIL							
Radio Observatorio do Itapetinga Atibaia, S.P., Brazil 23°11'3" S 46°33'48" W 800 meters	Instituto de Pesquisas Espaciais, CNP, CRAAM Caixa Postal 515 12.200 São José dos Campos Sao Paulo, Brazil (N. J. Parada, Director)	CNPQ, FINEP, Universidade Mackenzie	1)1.5 m equatorially mounted dish 2)13.7 m alt.-azimuth, computer driven, radome enclosed, mm-waves telescope, 22 m	1)Declinations -40° to +40° 2)Full sky	1)1.75 m^2 2)147 m^2	1)Circular 2)Depends on feed arrangement used	Sources-(1)
CANADA							
Algonquin Radio Observatory Lake Traverse, Ontario 45°57.3' N 78°04.4' W	Herzberg Institute of Astrophysics, National Research Council of Canada Ottawa, Ontario, Canada	National Research Council of Canada	1)45.7 m fully steerable paraboloid, alt.-azimuth mount, 22.5 m 2)10 m fully steerable paraboloid, equatorial mount, 7 m 3)642 m 40-element interferometer, equatorial mount, 4 m 4)1.8 m fully steerable paraboloid, equatorial mount, 5 m	1)Azimuth 0° to 360° Zenith angle 0° to 82° 2)±12 hours H.A. dec. -40° to +90° 3)±2 hours H.A. dec. -28° to 90° 4)±6 hours H.A. dec. -25° to 90°	1)efficiency of 45.7 m paraboloid 45% at λ2.8 cm 2) efficency 60% at 10 cm 4)2.5 m^2 Eff. 50% at 2800 MHz	1)All polarizations possible depending on feed 2)All polarizations possible depending on feed 3)90° Linear or Circular 4)0° Linear	Sources-(1) 1)Surface accuracy of 36 m solid surface is 0.7 mm rms 2)Surface accuracy 0.53 mm rms deviation from best fit paraboloid 3)Fan beam, 1.5 or 0.5 beamwidth, depending on mode of operation; 2790 MHz only 4)Used for patrol of total solar flux density
Dominion Radio Astrophysical Observatory Penticton, B. C. 49°19.3' N 119°37.1' W 550 meters	Dominion Radio Astrophysical Observatory P. O. Box 248 Penticton, B. C. (Dr. L.A. Higgs)	National Research Council	1)25.6 m paraboloid 2)Rotation synthesis array; four 8.5 m paraboloids two on a 300 m rail line plus two fixed 8.5 m paraboloids for a maximum spacing of 600 m 3)1.8 m paraboloid, 2700 MHz	1)Full sky 2)Full sky with $\|\delta\| \geq 20°$ 3)Ecliptic	1)515 m^2 2)208 m^2 3)2.5 m^2	1)Various 2)Circular 3)Linear	Sources-(1,5) 1)Polar mount 2)System includes 128 channel spectrometer 3)Microwave solar patrol

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
CANADA (con't)							
University of British Columbia 49°15'11" N 123°13'56" W	Department of Physics University of British Columbia	Natural Sciences and Engineering Research Council, University of British Columbia	4.57 m fully steerable paraboloid, equatorial mount, 6 m	Full sky coverage	-	Linear polarization	Spectroscopy
CHILE							
Maipu Radio Astronomy Observatory Maipu, Chile 33°30.0' S 70°51.4'W 444 meters	Observatorio Radio-astronomico de Maipu Universidad de Chile Casilla 68 Maipu, Chile (Jorge May) Operated jointly with the University of Florida Radio Observatory (904) 394-2052 (Dr. T.D. Carr)	University of Chile, University of Florida NSF	1)4-dipole broadside array, 27x54 m, 11m	Phase-steered N and S; fixed E-W beam (60°)	1,400 m^2 at 5.6 MHz	Linear N-S	Sources-(1)
			2)3-element Yagi, equatorial mount 10 m	Full Sky	530 m^2 at 9.18 MHz	Linear	
			3)4-dipole broadside array, 30x15 m, 7 m	Phase-steered E-W and N-S within 50° of zenith	450 m^2 at 10 MHz	Linear E-W	
			4)Pair of 4-element crossed Yagis, Alt. -Az. mount, 18 m	Full sky	330 m^2 at 13.1 MHz	Circular or Linear	Polarization measurements
			5)Pair of 3-element crossed Yagis, Alt. -Az. mount, 10 m	Full sky	160 m^2 at 16.7	Circular or Linear	Polarization measurements
			6)5-element Yagi, equatorial mount, 10 m	Full sky	220 m^2 at 18 MHz	Linear	
			7)Two pairs of 5-element crossed Yagis, Alt.-Az. mount, 10 m *	Full sky	220 m^2 at 18 MHz	Circular or Linear	High-resolution and Polarization measurements
					150 m^2 at 22.2 MHz	Circular or Linear	Polarization measurements
			8)7-element Yagi, equatorial mount, 10 m	Full sky	130 m^2 at 27.6 MHz	Linear	
			9)Log-periodic dipole	Full sky	0.5 x ^{2}	Linear	Wideband array operating from 13 to 27 MHz
			10)15-dipole broadside array, 9.3x65 m, 2.5 m	Phase-steered N and S; fixed E-W beam(60°)	600 m^2 at 32 MHz	Linear E-W	Meridian transit instrument
			11)528-dipole filled rectangular array, 73 m. E-W, 157 m. N-S; 2m	Phase-steered N-S within 45° of zenith; fixed E-W beam (5°)	11,500 m^2 at 45 MHz	Linear E-W	Meridian transit instrument
CONGO Radio Astronomy Observing Station Lwiro, Congo 2°16' S 28°49' E							Sources-(4) No information available on telescopes or frequencies
FINLAND Metsahovi Radio Research Station 60°13.1' N 24°23' E 61.1 meters	Helsinki University of Technology Radio Laboratory Otakaari 5 A SF-02150 ESPOO 15, Finland (Prof. Martti Tiuri)	Helsinki Univ. of Technology	13.7 m paraboloid (radome covered)				Sources-(1)

*VLBI with Florida, 7,040 km Baseline

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
FRANCE							
Station de Radioastronomie Nancay, France 47°22.8' N 2°11.8' E 150 meters	Department de Radioastronomie, Observatoire de Paris-Meudon, France		1)35x200 m partly steerable radiotelescope	Elev.: 0-120° H.A. : 1 Hr.	7000 m^2	Vertical and horizontal	Source (1)
			2)EW array of 32 x 5 m paraboloids	Elev.: 0-110° H.A. : 1 Hr.	500 m^2	Vertical	Source (1)
			3)EW array of 16 steerable yagi and 2x10 m paraboloids	Elev.: 0-110° H.A. : 6 Hr.	300 m^2	Circular R & L	Source (1)
			4)N.S. array of 8x10 m paraboloids	Elev.: 0-110° H.A. : 1 Hr.	500 m^2	Vertical	Source (1)
			5)100x100 m array of 96 spiral log periodic antennas	Elev.: 20-90° H.A. : 6 Hr	900 m^2	Circular	Source (1)
			6)EW array of 16x 1 m paraboloids	Elev.: 0-90° H.A. : 30 mn.	12 m^2	Vertical	Source (1)
Observatoire de Bordeaux Floirac, France	Observatoire de Bordeaux 33270 Floirac, France		1)7 m paraboloid, equatorial mount 2)Two 2.5 m paraboloids, alt.-azimuth mount (two antennas-interferometer), baseline E-W 64 m 3)2.3 m paraboloids alt.-azimuth mount				Sources-(1) 2)Computer-controlled operation
FEDERAL REPUBLIC OF GERMANY							
Radiosternwarte Effelsberg 50°31'28"6 N 6°53'01"5 E 366 meters	Max-Planck-Institut für Radioastronomie 5300 Bonn 1, Auf dem Hügel 69, FRG (Prof. Dr. R. Wielebinski)	Max-Planck-Gesellschaft	100 m paraboloid, 98 m	0°- 360° azimuth 90°- 7° elevation	7854 m^2	Variable	Sources-(1)
Radiosternwarte Stockert 50°34'2 N 60°43'4 E 453 meters	Radioastronisches Institut der Universitat Bonn, 5300 Bonn 1 Auf dem Hügel 71, FRG (Prof. Dr. R. Wielebinski)	Univ. of Bonn, Land Nordrhein-Westfalen, Deutsche Forschungsgemeinschaft	1)25 m paraboloid	1)0°- 360° azimuth 90°- 7° elevation	1)491 m^2	1)Variable	Sources-(1)
			2)10 m paraboloid, equatorial mount	2)HA ± 4 hrs 85°- 0° elevation	2)78.5 m^2	2)Variable	
Fraunhofer Institute Freiburg, FRG 47°54.8' N 7°54.4' E 1240 meters							Sources-(4)
Astronomical Institute Tübingen University Aussenstelle Weissenau, FRG 47°45'57" N 9°35'14" E 430 meters	Astronomical Institute Tübingen University Aussenstelle Weissenau, FRG	Tübingen Univ., Fed. State Baden Württemberg	7 m parabola, two Yagis groups and one dipole reflector on same alt.-azimuth mount	Full sky		Vertical	Sources-(1)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES

GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
GERMAN DEMOCRATIC REPUBLIC							
Astrophysical Observatory Tremsdorf, GDR (13 km SSW of Potsdam) 52°17.1' N 13°08.2' E 35 meters	Astrophysical Observatory Tremsdorf, GDR	Akademie der Wissenschaften Zu Berlin	10.5 m paraboloid, equatorial mount				Sources-(1,3,4,5)
GHANA							
University of Ghana Observatory Achimota, Ghana 5°38' N 0°13.7' W 18 meters	Department of Physics University of Ghana P.O. Box 63 Legon, Accra, Ghana (Rev. Prof. John R. Koster)	University of Ghana	8.5 m paraboloid, alt-azimuth mounting	Full sky			Sources-(1)
GREECE							
Mt. Pentelli Observatory Athens, Greece 38° N 23°45' E	National Observatory of Athens Athens, Greece	USAF	2.44 m paraboloid, equatorial mount	H.A. Full sky Dec. -30° to +30°	2.56 m^2 @ 55% eff.	Lin.-Vertical at 0 hrs.	Sources-(1)
INDIA							
Bombay Observatory Bombay, India 19°10' N 73°07' E	Tata Institute of Fundamental Research Radio Astronomy Group Colaba, Bombay 5, India		Thirty-two 1.8 m paraboloids	Full sky	32 x 1 m^2		Sources-(2)
Ootacamund Observatory Ootacamund, India 11°23' N 76°40' E 2200 meters	Tata Institute of Fundamental Research Radio Astronomy Group Homi Bhabha Road Bombay-5, India		Parabolic cylinder 530 x 30 m, with array of 968 dipoles, supported by 24 steel towers	H.A. -4^h to $+5^h30^m$ Dec. -36° to +36°	9500 m^2		Sources-(1)
Kodaikanal Astrophysical Observatory Kodaikanal, India 10°13.8' N 77°28.1' E 2343 meters							Sources-(4)
ITALY							
Arcetri Astrophysical Observatory Florence, Italy 43°45.2' N 11°15.3' E 184 meters	Arcetri Astrophysical Observatory Florence, Italy	University of Florence					Sources-(4,5)
University of Bologna Observatory Medicina, Italy 44°31' N 11°39' E 10 meters	University of Bologna Bologna, Italy	Ministry of Public Education	Mills cross, each arm 1200 x 30 m	Azimuth fixed in meridian plane, 15°- 90° elevation	35,000 m^2		Sources-(2,3,5)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
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Name, Location and Altitude	Operating Administration (information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
JAPAN							
Hiraiso Branch, Radio Research Laboratories Nakaminato, 311-12 Japan 36°21.9' N 140°37.5 E 26 meters	Radio Research Laboratories		10 m, 6 m, and 1.1 m paraboloids, equatorial mount, and one 10 m parabola alt.-azimuth mount			Two Circular for 100, 200 and 500 MHz	Sources-(1)
Kashima Branch, Radio Research Laboratories Kashima, 314 Japan 35°57.2' N 140°40.0' E 42 meters	Radio Research Laboratories		26 m and 30 m paraboloids, alt.-azimuth mount	Full sky		Linear	Sources-(1)
Kisarazu College Observatory Kisarazu, 292 Japan 35°22.8' N 139°57.0' E 42 meters	Kisarazu Technical College		1.5 m paraboloid, equatorial mount			Linear	Sources-(1)
Toyokawa Observatory, Nagoya University Toyokawa, 442 Japan 34°50.1' N 137°22.3' E 18 meters	Research Institute of Atmospherics Nagoya University (Dr. Haruo Tanaka)		1)32+2 EW + 17 NS 3 m paraboloids, compound interferometer or radioheliograph, 437 m EW 107 NS base, 8 cm wavelength	1)±2 hours around CMP		1)Two Circular	Sources-(1)
			2)32-2 m - 2-3 m EW + 16-1.2 m NS paraboloids, compound interferometer or radioheliograph, 177 m EW 43 m NS base, 3.18 cm wavelength	2)±2 hours around CMP		2)Two Circular	
			3)1.2 m, 1.5 m, 2.2 m, and 3 m paraboloids			3)Two Circular	
			4)Twin 2 m paraboloid			4)Two Circular	
			[All above are equatorial mount]				
			5)10 m paraboloid, alt-azimuth mount	5)Full sky			
			6)512-dipole array, 2000 m^2	6)Declination 0° to 70°		6)Linear	
Fujigane Station, Toyokawa Observatory, Nagoya University Fujigane, 409-37 Japan 35°25.6' N 138°36.7' E 1000 meters	Research Institute of Atmospherics Nagoya University (Dr. Haruo Tanaka)		256-dipole array, 1000 m^2	Declination 0° to 70°		Linear	Sources-(1)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
JAPAN (con't)							
Sugadaira Station, Toyokawa Observatory Nagoya University Sugadaira, 386-22 Japan 36°31.3' N 138°19.2' E 1300 meters	Research Institute of Atmospherics, Nagoya University (Dr. Haruo Tanaka)		256-dipole array, 1000 m^2	Declination 0° to 70°		Linear	Sources-(1)
Tokyo Astronomical Observatory Mitaka, 181 Japan 35°40.3' N 139°32.4' E 70 meters	University of Tokyo		1)24 m spherical reflector 2)6 m paraboloid, alt.-azimuth mount, for mm waves 3)80 cm paraboloid 4)1.1 m paraboloid	1)Azimuth 180° or 360°, 40°- 90° elevation, 267 m^2 2)Full sky		 3)Two Circular 4)Linear	Sources-(1)
Nobeyama Observatory, University of Tokyo Nobeyama, 384-13 Japan 35°56.0' N 138°29.0' E 1300 meters	Tokyo Astronomical Observatory, University of Tokyo		1)8+3 6 m (two 8 m) EW + 4+2 6 m NS wire-net paraboloids, compound interferometer, 2327 m EW 1440 m NS base, equatorial mount, 160 MHz 2)12 1.2 m paraboloids, equatorial mount, grating interferometer, 19 m base, for 1.76 cm wavelength 3)8 m and 6 m wire-net paraboloids, equatorial mount			1)Two Circular 2)Linear 3)Linear	Sources-(1)
Radio Astronomy Laboratory, Dept. of Physics, Nagoya Un. Nagoya, 464 Japan 35°08.8' N 136°58.4' E 75 meters	Department of Physics, Nagoya University		1)8 40 cm paraboloids with equatorial-plane reflectors, operated as interferometer; total length 50.1 m	Hour angle Full sky Declination -35° to +35°		1)Linear	Sources-(1)
Kagoshima Space Center, University of Tokyo Uchinoura, 893-14 Japan 31°15.0' N 131°04.8' E 260 meters	Institute of Space and Aeronautical Science, University of Tokyo		1.2 m paraboloid			Linear	Sources-(1)
NETHERLANDS							
Dwingeloo Radio Observatory Dwingeloo, Netherlands 52°48.8' N 6°23.8' E 12 meters	Netherlands Foundation for Radio Astronomy Radiosterrenwacht Dwingeloo, Netherlands 05219 - 7244	Netherlands Organization Advancement of Pure Research-Z.W.O. The Hague	1)25 m alt.-azimuth paraboloid 2)Two 7.5 m equatorial 3)3.5 m equatorial 4) .8 m equatorial	1)Full sky 2)Full sky 3)Full sky 4)Full sky	1)300 m^2 2)25 m^2 3) 6 m^2	1)Variable 2)Circular	Sources-(1)
Westerbork Radio Observatory Hooghalen, Netherlands 52°55.0' N 6°36.25' E 16 meters	Netherlands Foundation for Radio Astronomy Radiosterrenwacht Westerbork Post Hooghalen 05939-421	Netherlands Organization Advancement of Pure Research-Z.W.O. The Hague	Fourteen 25 m equatorial paraboloids, operated as 40 baseline synthesis array; total length 1600 m E-W	Full sky North of declination -37°	275 m^2 per antenna	Complete	Sources-(1)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
NETHERLANDS (con't)							
Nederhorst den Berg Observatory Nederhorst den Berg, Netherlands 52°14.1' N 5°04.6' E 0 meters	P.T.T. Radio Laboratory Leidschendam, Netherlands	P.T.T.	1)10 m alt.-azimuth paraboloid 2)1.8 m equatorial paraboloid	1)Full sky 2)Full sky	1)40 m^2 2)1.5 m^2		Sources-(6)
NORWAY							
Observatory of the University of Oslo Harestua, Norway 60°12.5' N 10°45.5' E 585 meters	Institute of Theoretical Astrophysics University of Oslo Blindern, Norway		1)7.6 m paraboloid 2)9.1 m paraboloid 3)Three mattress antennas on E-W baseline; each antenna is composed of 16 half-wave dipoles	1)Full sky 2)Full sky 3)Fixed azimuth 0°- 90° elevation	1)28 m^2 2)40 m^2 3)3 x 18 m^2		Sources-(2,3,4)
PERU							
Jicamarca Radio Observatory Lima, Peru 11°57' S 76°52' W	Institute of Geophysics Lima, Peru (Dr. Carlos Calderon)	NSF, NASA, NOAA and Peruvian Government	Broadside array of 96 x 96 crossed dipoles	Declination -9.52° to -16.24°	8.4 x 10^4 m^2	Two independent linears; any polarization can be synthesized	Sources-(1) Normally used for ionospheric research; occasionally used for passive and radar astronomy
PHILIPPINES							
Manila Observatory Quezon City, Philippines 14°38' N 121°05' E	Manila Observatory Quezon City, Philippines	Manila Observatory USAF	1)2.44 m paraboloid 2)3.0 m paraboloid 3)Two-element interferometer	1)H.A. Full sky Dec. -30° to +30° 2)H.A. Full sky Dec. -30° to +30°	1)2.56 m^2 @ 55% eff. 2)5.5 m^2 @ 55% eff.	1)Lin.-Vertical at 0 hrs. 2)Lin.-Vertical at 0 hrs.	Sources-(1) 3)Using 1) and 2) as elements
POLAND							
Astronomical Observatory Torun-Piwnice, Poland 53°05' N 18°33' E 80 meters	Nicolaus Copernicus University Torun, Poland		1)Two cylindrical paraboloids, 4 x 8 m, 24 m E-W spacing 2)Two corner reflectors 6 x 6 x 80 m with eight dipoles, 1400 m E-W spacing 3)Two corner reflectors with eight wideband dipoles, 220 m E-W spacing 4)Two log-periodic aerials, 20 m E-W	1)120°- 240° azimuth 10°- 70° elevation 2)160°- 200° azimuth 10°- 80° elevation 3)170°- 190° azimuth 20°- 80° elevation 4)120°- 240° azimuth 10°- 70° elevation	1)18 m^2 2)800 m^2 3)80 m^2 4)0.7 m^2		Sources-(2,3)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
SPAIN							
Observatorio del Elbo Roquetas (Tarragona) 40°49.2' N 0°29.5' E 43 meters	Solar Section Observatorio del Elbo		2.4 m paraboloid dish	210° x 80°	2.1 m^2	Linear	Sources-(1) Solar flux patrol
SWEDEN							
Kiruna Geofysiska Observatorium Kiruna, Sweden 67°50' N 20°25' E	Kiruna Geofysiska Observatorium Kiruna, Sweden		1)Two-element 60 m interferometer, each element is a ten-element log-periodical antenna for 35-65 MHz 2)Three-element Yagi	1)All azimuths 0°- 70° elevation 2)All azimuths 90° elevation	1)23 m^2 @ 50 MHz 2)51 m^2		Sources-(2,3)
Onsala Space Observatory Onsala, Sweden 57°23.6' N 11°55.2' E 6.5 meters	Onsala Space Observatory S-43 34 Onsala, Sweden (0300) 60650 (Prof. O.E.H. Rydbeck)	Chalmers University of Technology Gothenburg, Sweden	25.6 m paraboloid, equatorial mount, 14 m	Full sky	275 m^2 @ 53% eff.	Variable	Sources-(1)
UNITED KINGDOM							
Appleton Laboratory Ditton Park Slough, England 51°29' N 00°34' W 15 meters	Science Research Council Appleton Laboratory Ditton Park Slough, England		1.2 m, 1 m, 0.5 m, 0.3 m paraboloids, equatorial mount	Full sky	60% of physical area	Linear	Sources-(1) Solar patrol
Appleton Laboratory Chilbolton Observatory Chilbolton Stockbridge Hants, England 51°08'40" N 01°26'13" W 77 meters	Science Research Council Appleton Laboratory Ditton Park Slough, England		Fully steerable, alt.-azimuth 25 m paraboloid	Full sky	500 m^2	Variable	Sources-(1) Used only partly for radio astronomy
Mullard Radio Astronomy Observatory Cambridge, England 52°10' N 0°02.4' E 26 meters	University of Cambridge Cambridge, England		1)Dipole array 200 x 450 m 2)Cylindrical reflector 20 x 450 m 3)Three 18.3 m steerable paraboloids 4)Four 9 m steerable paraboloids 5)Eight 13 m steerable paraboloids	1)180° azimuth 20°- 90° elevation 2)180° azimuth 30°- 90° elevation 3)Full sky 4)Full sky 5)Full sky	1)20,000 m^2 2)10,000 m^2 3)2,000,000 m^2 (effective) 4)1,000,000 m^2 (effective) 5)300,000 m^2 (effective)		Sources-(1)

FOREIGN RADIO AND RADAR ASTRONOMY OBSERVATORIES
GENERAL INFORMATION

Name, Location and Altitude	Operating Administration (Information contact)	Sponsors	Telescopes				
			Type, Size and Height	Sky Coverage (degrees)	Collecting Area	Polarization	Remarks
UNITED KINGDOM (con't)							
Nuffield Radio Astronomy Laboratories Jodrell Bank, Macclesfield Cheshire, England 53°14.2' N 2°18.4' W 78 meters	Department of Radio Astronomy University of Manchester Manchester, M13 9PL England		1)Mark IA 76 m, fully steerable paraboloid Az-el mounting 128.5 m	1)Full sky	1)4600 m^2	1)Variable	Sources-(1) 1)Coordinates in Col. 1 refer to the position of this instrument
			2)Mark II 38 x 25.9 m fully steerable paraboloid Az-el mounting	2)Full sky	2)770 m^2	2)Variable	
			3)Mark III 38 x 25.9 m fully steerable paraboloid Az-el mounting	3)Full sky	3)770 m^2	3)Variable	3)Situated at Wardle, Cheshire 24 km South-West of Jodrell Bank Coordinates: 53°06.8' N 2°24.2' W
			4)25 m steerable paraboloid	4)Full sky	4)250 m^2	4)Variable	4)Situated at Defford: 52°05' N 2°08' W
			5)25 m steerable paraboloid	5)Full sky	5)250 m^2	5)Variable	5)Situated at Knockin 52°47.4'N 2°59.7'W
USSR							
Byurakan Astrophysical Observatory Byurakan, USSR			1)Radio interferometer 2)Four fixed cylindrical paraboloids 3)10 m paraboloid				Sources-(5,6)
Crimean Astrophysical Observatory Simeis, Crimea, USSR 44°43.7' N 34°01.0' E 550 meters	Lebedev Physical Institute Moscow, USSR		1)22 m steerable paraboloid 2)18 x 8 m cylindrical steerable paraboloid 3)19 m steerable paraboloid 4)Two 31 m fixed reflectors, used as interferometer with 800 m E-W baseline				Sources-(4,5,6)
Pulkovo Observatory Leningrad, USSR 59°46.1' N 30°19.4' E 70 meters			1)16 m fixed paraboloid 2)120 x 3 m parabolic sector 3)Two 12 m paraboloids transit mount 4)Two 10 x 2 m cylindrical paraboloids				Sources-(4,5)
Serpukhov Radiophysical Station Serpukhov, USSR	Lebedev Physical Institute Moscow, USSR		1)22 m steerable paraboloid 2)Two 1000 x 40 m parabolic cylinders				Sources-(5,6)
Institute of Radiophysics and Electronics Kharkhov, USSR	Institute of Radiophysics and Electronics Ukrainian Academy of Sciences (Prof. S. Ya. Brauda)		UTR-2 telescope in T-dipole array 1860 m, N-S, 900 m E-W	-50° to +50° azimuth -85° to +85° elevation			Sources-(1)
Zimenki Radio Astronomy Station Zimenki, USSR	Institute for Radiophysics Gorki State University		Two 15.2 m paraboloids				Sources-(5)
Special Astrophysical Observatory Zelenchukskaya, USSR 43°49.5' N 41°35.4' E	Special Astrophysical Observatory of the Academy of Sciences		895 2 by 7.4 meter panels arranged in a ring, 576 meters in diameter with a 400 m flat reflector and five secondary feeds.	Full sky	13,000 m^2		Sources - (5)

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
AUSTRALIA									
Radio Astronomy Observatory Bothwell, Tasmania 42°18' S 147°02' E	Circular filled-in array		A A A	1.05 MHz 2.1 MHz 2085 MHz	12 kHz	5000° K	24		
CSIRO Solar Radio Observatory Culgoora, NSW 30°19.3' S 149°34.3' E	1)Radioheliograph	Solar mapping	A A B	160 MHz 80 MHz 43 MHz	1 MHz 1 MHz 1 MHz	400° K 300° K 400° K	6 6 6	2/68 Continuous 8/72 Continuous 8/73 Continuous	Also non-solar continuum observations - periodic scheduling
	2)Radiospectrograph	Solar spectrum	A or B	8-8000 MHz	~0.5% of frequency	~1000° K (3000° K above 2000 MHz)	10	Continuous	
CSIRO Radio Astronomy Observatory Epping, NSW 33°46.36'S 151°06.07' E	4 m paraboloid		B B	33-50 GHz 80-120 GHz	500 MHz 500 MHz	800-1800 K	24 24		
Radio Astronomy Observatory Fleurs, NSW 33°51' S 150°46' E	1)Rotational synthesis telescope. 64 x 6 m, 4 x 14 paraboloids, 800 m E-W and 800 m N-S			1415 MHz	8 MHz	200° K	24		
	2)Compound interferometer 800 m E-W			722.5 MHz	2 MHz	600° K	22-06 GMT		
	3)Grating Cross			1415 MHz	0.5 MHz	800° K	22-06 GMT		
	4)Cross, 914 m arms			30 MHz	500 kHz	1000° K	24		
Molonglo Radio Obseratory Hoskintown, NSW 35°22' S 149°25' E	EW cylindrical parabola 1.6 km x 12m	(1) Multiple beam rotational synthesis (2) Astronomy (3) Pulsars (4) Variable sources	A or B A B	843 MHz	4 MHz	150° K	24		
Australian National Radio Astronomy Observatory Parkes, NSW 33°00.0' S 148°15.7' E	1)64 m paraboloid		B B B B B B B B B B B B B B	153 MHz 275 MHz 403 MHz 610 MHz 1.36-1.45 GHz 1.6-1.72 GHz 2.5-2.9 GHz 3.1-3.4 GHz 4.3-5.3 GHz 5.6-6.6 GHz 8.6-9.2 GHz 14.3-15 GHz 13.5-18.5 GHz 21-25 GHz 33-50 GHz	3 MHz 10 MHz 10 MHz 10 MHz 90 MHz 70 MHz 200 MHz 40 MHz 500 MHz 150 MHz 35 MHz 700 MHz 500 MHz 500 MHz 500 MHz	180° K 200° K 220° K 150° K 95° K 90° K 80° K 130-230° K 60-90° K 160° K 180° K 90° K 600° K 600° K 800-1800° K	24 24 24 24 24 24 24 24 24 24 24 24 24 24 24		
	2)Interferometer			1400 MHz	10 MHz	300° K	24		

* Frequencies are those listed in the ITU List of Stations and/or the summary in Document IUCAF/179, except information on Australian and Brazilian stations was provided by the Operating Administration.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
AUSTRALIA (con't)									
Llanherne Radio Astronomy Observatory Tasmania 42°50.6' S 147°29.6' E	1)760 m circular dipole array 2)8 m x 160 m rectangular dipole array 3)13.5 m paraboloid			4 kHz 9.6 MHz 18.5 MHz 24.5 MHz 28.0 MHz 40.0 MHz 18-20 MHz 20-40 MHz 20-200 MHz					Spectrum analysis Spectrum analysis Spectrum analysis
BELGIUM									
Humain Station 50°11.5' N 5°15.3' E	1)6 m paraboloid		A	151.5 MHz 408 MHz	3 MHz 2 MHz	400° K 500° K	24 Daylight		
	2)7.5 m paraboloid		A	610 MHz	8 MHz	900° K	24		
	3)Interferometer		A/B	408 MHz	4 MHz	500° K	24		
BRAZIL									
Radio Observatorio do Itapetinga (Universidade Mackenzie) Atibaia, S.P., Brazil 23°11'3" S 46°33'48" W	1)1.5 m dish	Solar Continuum/ polarization	B	7 GHz	10 MHz	3000° K	10	Daily	
	2)13.7 m mm-wave telescope	Continuum or line	A/B	10 GHz 20-24 GHz 48 GHz	100 MHz 100 MHz 500 MHz	1000° K 1200° K 1500° K	24 24 24	Variable Variable Variable	

*Frequencies are those listed in the ITU List of Stations and/or the summary in Document IUCAF/179, except information on Australian and Brazilian stations was provided by the Operating Administration.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
CANADA									
Algonquin Radio Observatory Lake Traverse 45°57.3' N 78°04.4'W	1)45.7 m paraboloid	Continuum and Pulsar	B	408 MHz	8 MHz	200° K	24	Variable	Telescope scheduled quarterly
		LBI	A	1414-1418 MHz	4 MHz	86° K	24		
				2692-2696 MHz	4 MHz	140° K	24		
		Continuum Line	B	3.0-4.0 MHz	300 MHz	50° K	24	Variable	
		Continuum Line	B	6.0-6.5 MHz	200 MHz	90° K	24	Variable	
		Continuum Line	B	10.0-11.0 MHz	200 MHz	125° K	24	Variable	
		Continuum Line	B	22.0-24.0 MHz	300 MHz	200° K	24	Variable	
	2)10 m paraboloid								Inactive except for satellite communication for satellite VLBI and holography
	3)40-element interferometer	Solar continuum	A	2790 MHz	400 MHz	900° K	4	Daily	Fan beam scan of solar disc
	4)1.8 m paraboloid	Solar continuum	A	2800 MHz	100 MHz	600° K	12	Daily	Solar patrol
Dominion Radio Astrophysical Observatory Penticton, B.C. 49°19.3' N 119°37.1' W	1)25.6 m paraboloid	H-Line	B	1400-1450 MHz	1 MHz	86° K	24	Variable	
		Continuum	B	1400-1450 MHz	6 MHz	86° K	24	Variable	
		LBI	A	404-412 MHz	8 MHz	100° K	24	Variable	
		LBI	A	1414-1418 MHz	4 MHz	86° K	24	Variable	Simultaneous operation of both frequencies
			B	2692-2696 MHz	4 MHz	140° K	24	Variable	
		LBI	B	1600-1730 MHz	4 MHz	80° K	24	Variable	Continuous and OH line
		Pulsar	A	408 MHz	4 MHz	100° K	24	Variable	
			A	146 MHz	1 MHz	100° K	24	Variable	
			A	113 MHz	500 MHz	100° K	24	Variable	
	2)Super synthesis	H-Line 128 frequencies	B	1400-1450 MHz	2 MHz	80° K	24	Continuous	
		Continuum	B	406-410 MHz	4 MHz	100° K	24	Continuous	
	3)1.8 m Solar patrol	Continuum	A	2700 MHz	8 MHz	400° K	Daylight	Continuous	
University of British Columbia Millimeter wave-telescope 49°15'11" N 123°13'56" W	4.57 m telescope	Line	B	80-120 MHz	250 MHz	1000° K (Single sideband)		Variable weather dependent	Galactic structure and molecular clouds

* Information on frequencies for canadian stations was provided by the Operating Administrations.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
CHILE									
Maipu Radio Astronomy Observatory	1)4-dipole array	Jupiter	A	5.6 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
33°30.0' S 70°51.4' W	2)3-element Yagi	Jupiter	A	9.18 MHz	4 kHz	Galactic	21-11 GMT	Continuous	2)RAE-2 Sat. Freq.
	3)4-dipole array	Jupiter	A	10 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
	4)Crossed Yagis	Jupiter	A	13.1 MHz	4 kHz	Galactic	21-11 GMT	Continuous	4)RAE-2 Sat. Freq.
	5)Crossed Yagis	Jupiter	A	16.7 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
	6)5-element Yagi	Jupiter	A	18 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
	7)Crossed Yagis	Jupiter (VLBI)	A	18 MHz	16 kHz	Galactic	21-11 GMT	Continuous	7)VLBI with Florida, 7,040 km baseline
		Jupiter (VLBI)	A	22.2 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
	8)7-element Yagi	Jupiter	A	27.6 MHz	4 kHz	Galactic	21-11 GMT	Continuous	
	9)Log-periodic array	Jupiter	A	13-27 MHz	100 kHz	Galactic	21-11 GMT	Continuous	9)Sweep freq. system for decametric bursts
	10)15-dipole array	Jupiter	A	32 MHz	500 kHz	Galactic	21-11 GMT	Continuous	
	11) 528-dipole array	Solar, Interplanetary, Scintillation, Galactic and Extragalactic Sources	A	45 MHz	1 MHz	Galactic	24	Continuous	
FINLAND									
Metsähovi Radio Research Station	13.7 paraboloid	Solar radiation	A	11.6 GHz	150 MHz	1500° K	Variable	Variable	
60°13.1' N 24°23.6' E		Solar bursts		37 GHz	700 MHz	1200° K	Variable	Variable	
		Continuum	B	37 GHz	700 MHz	1200° K	Variable	Variable	
		Continuum	B	80 GHz	500 MHz	1200° K	Variable	Variable	
		Spectral Line, VLBI	B	(22-24 GHz)					Cooled mixer
		Spectral Line, VLBI, Solar radiation	B	(43-49 GHz)					Cooled mixer
		Spectral Line, Continuum, Solar radiation	B	(80-90 GHz)					Cooled mixer
FRANCE									
Station de Radioastronomie Nancay, France	1)Partly steerable	Extragalactic	B	1400 MHz	40 MHz	50° K	Variable	Continuous	
47°22.8' N 2°11.8' E		Galactic	B	1612 MHz	2 MHz	50° K	Variable	Continuous	
		Planets	B	1666 MHz	10 MHz	50° K	Variable	Continuous	
			B	1720 MHz	2 MHz	50° K	Variable	Continuous	
	2)EW array	Sun	A	408 MHz	2 MHz	500° K	11[b]-13	Continuous	
	3)EW array	Sun	A	169 MHz	2 MHz	500° K	9-15	Continuous	)Shift from 169 to)152 MHz is consi-)dered. Tests are)in progress
	4)NS array	Sun	A	169 MHz	2 MHz	500° K	11-13	Continuous	
	5)Square array	Sun, Jupiter	A B	20-120 MHz		600° K	9-15 Variable	Continuous	Spectrum analyser
	6)EW array	Sun	A	9400 MHz		2000° K	11-13		
Observatoire de Bordeaux Floirac, France	1)7 m paraboloid	Sun flux	A	930 MHz	5 MHz	2000° K	Daylight	Continuous	
	2)Interferometer		B	35 MHz	200 MHz	4000° K	Deylight	Continuous	
	3)2.5 m paraboloid			75-115 GHz		370° K			

* Frequencies are those listed in the summary in Document IUCAF/179, except information for Observatories at Maipu, Chile, Metsahovi, Finland, Floirac, France, was provided by the Operating Administration.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
FEDERAL REPUBLIC OF GERMANY									
Radiosternwarte Effelsberg 50°31'28".6 N 6°53'01".5 E	100 m paraboloid	Pulsar and Spectral Line	B	327 MHz	10 MHz	250° K	24	Variable	Periodic scheduling
		Continuum	B	408 MHz	8 MHz	250° K	24	Variable	Periodic scheduling
		Continuum and Spectral Line	B	1370-1430 MHz	40 MHz	50° K	24	Variable	Periodic scheduling
		Continuum and Spectral Line	B	1610-1720 MHz	50 MHz	50° K	24	Variable	Periodic scheduling
		Spectral Line	B	3349 MHz	10 MHz	150° K	24	Variable	Periodic scheduling
		Continuum	B	2695 MHz	50 MHz	80° K	24	Variable	Periodic scheduling
		Continuum and Spectral Line	B	4650-5050 MHz	500 MHz	50° K	24	Variable	Periodic scheduling
		Spectral Line Search	B	8600-9600 MHz	100 MHz	80° K	24	Variable	Periodic scheduling
		Continuum	B	10.69 GHz	100 MHz	100° K	24	Variable	Periodic scheduling
		Continuum	B	14.75 GHz	500 MHz	150° K	24	Variable	Periodic scheduling
		Spectral Line and Continuum	B	19-26 GHz	500 MHz	50° K	24	Variable	Periodic scheduling
		Continuum	B	32.0 GHz	2 GHz	350° K	24	Variable	Periodic scheduling
Radiosternwarte Stockert 50°34!2 N 60°43!4 E	1)25 m paraboloid	Pulsar and Spectral line	B	1420 MHz	20 MHz	50° K	24	Continuous	Periodic scheduling
		Continuum	B	2695 MHz	50 MHz	100° K	24	Variable	Periodic scheduling
	2)10 m paraboloid	Solar	B	17.5 GHz	10 MHz	2800° K	12	Continuous	Periodic scheduling
		Solar	B	35.5 GHz	500 MHz	3800° K	12	Continuous	Periodic scheduling
Astronomical Institute Tübingen University Aussenstelle Weissenau, FRG 47°45'47" N 9°35'14" E	7 m parabola, two Yagis and one dipole reflector	Solar patrol	A	30-1000 MHz	.3-10 MHz	7 db	Daylight	8/60-Continuous	Spectrum analyzer
			A	46 MHz	.5 MHz	7 db	Daylight		
			A	142 MHz	1.5 MHz	7 db	Daylight		
			A	300 MHz	3 MHz	7 db	Daylight		
			A	611 MHz	6 MHz	7 db	Daylight		
			A	1000 MHz	10 MHz	7 db	Daylight		

*Frequencies are those listed in the summary in Document IUCAF/179, except information for Observatories at Maipu, Chile, Floirac, France, and Weissenau, FRG was provided by the Operating Administration.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
GERMAN DEMOCRATIC REPUBLIC									
Astrophysical Observatory Tremsdorf, GDR 52°17.1' N 13°08.2' E	Telescope not identified	Solar Flux	A	15 MHz			07-15 GMT		Measurements of the circular polarization are also made at 23, 30, 40, 113, 793, 1470 and 9500 MHz.
		Solar Flux	A	23 MHz			07-15 GMT		
		Solar Flux	A	30 MHz			07-15 GMT		
		Solar Flux	A	40 MHz			07-15 GMT		
		Solar Flux	A	64 MHz			07-15 GMT		
		Solar Flux	A	113 MHz			07-15 GMT		
		Solar Flux	A	234 MHz			07-15 GMT		
		Solar Flux	A	287 MHz			07-15 GMT		
		Solar Flux	A	510 MHz			07-15 GMT		
		Solar Flux	A	793 MHz			07-15 GMT		
		Solar Flux	A	1470 MHz			07-15 GMT		
		Solar Flux	A	3000 MHz			07-15 GMT		
		Solar Flux	A	9500 MHz			07-15 GMT		
GREECE									
Mt. Pentelli Observatory Athens, Greece 38° N 23°43' E	2.44 m paraboloid	Solar patrol	A	1415 MHz	8 MHz	1000° K	Daylight	Continuous	
			B	2665 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	2725 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	4965 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	5025 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	8770 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	8830 MHz	16 MHz	1000° K	Daylight	Continuous	
INDIA									
Bombay Observatory Bombay, India 19°10' N 73°07' E	Thirty-two 1.8 m paraboloids		A	612 MHz	8 MHz	800° K			Intermittent operations
Ootacamund Observatory Ootacamund, India 11°23' N 76°40' E	Parabolic cylinder 530 x 30 m	Galactic and extra-galactic continuum	B	326.5 MHz	4 MHz	350° K	24		
ITALY									
University of Bologna Observatory Medicina, Italy 44°31' N 11°39' E	Mills cross		B	408 MHz	8 MHz	100° K	24		

*Frequencies are those listed in the ITU List of Stations and/or the summary in Document IUCAF/179, except information on the Greek and Indian Observatories was provided by the Operating Administrations.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
JAPAN									
Hiraiso Branch, Radio Research Laboratories Nakaminato, Japan 36°21.9' N 140°37.5' E	1)10 m paraboloid alt.-azimuth mount	Solar radio	A	31.65 GHz	23.5 MHz			Daylight	
	2)10 m paraboloid	Solar patrol	A	100.5 MHz 201 MHz	100 kHz 250 kHz				
	3)6 m paraboloid	Solar patrol	A	501 MHz	1000 kHz				
	4)1.1 m paraboloid	Solar patrol	A	9500 MHz	9 MHz				
Kashima Branch, Radio Research Laboratories Kashima, Japan 35°57.2' N 140°40.0' E	26 m and 30 m paraboloids	Satellite communication experiment and space research	B	4119 MHz 4159.171 MHz 4178 MHz 6550 MHz					
Kisarazu College Observatory Kisarazu, Japan 35°22.8' N 139°57.0' E	1.5 m paraboloid	Solar patrol	A	48 GHz					
Toyokawa Observatory, Nagoya University Toyokawa, Japan 34°50.1' N 137°22.3' E	1)Yagi 512-dipole array	Interplanetary scintillation	A B	21.86 MHz 69.3 MHz					
	2)3 m paraboloid	Solar patrol	A	1000 MHz					
	3)2.2 m paraboloid	Solar patrol	A	2000 MHz					
	4)Twin 2 m paraboloid	Solar spectrum	A	2000-4000 MHz					
	5)1.5 m paraboloid	Solar patrol	A	3750 MHz					
	6)32+2 EW + 17 NS 3 m paraboloids	Solar EW scan and radioheliograph	A	3750 MHz					
	7)32-2 m + 2-3 m EW + 16-1.2 m NS paraboloids	Solar EW scan and radioheliograph	A	9400 MHz					
	8)1.2 m paraboloid	Solar patrol	A	9400 MHz					
	9)10 m paraboloid	Continuum	B	3750 MHz 9400 MHz					Intermittent operations
Fujigane Station, Toyokawa Observatory Fujigane, Japan 35°25.6' N 138°36.7' E	Yagi 256-dipole array	Interplanetary scintillation	A B	21.86 MHz 69.3 MHz					
Sugadaira Station, Toyokawa Observatory Sugadaira, Japan 36°31.3' N 138°19.2' E	Yagi 256-dipole array	Interplanetary scintillation	A B	21.86 MHz 69.3 MHz					

*Information on frequencies for Japanese stations was provided by the Research Institute of Atmospherics, Nagoya University.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
JAPAN (Con't)									
Tokyo Astronomical Observatory, Mitaka Mitaka, Japan 35°40.3' N 139°32.4' E	1)24 m spherical reflector	21 cm line	B	1420 MHz					
	2)80 cm paraboloid	Solar patrol	A	17 GHz					
	3)1.1 m paraboloid	Solar patrol	A	35 GHz					
	4)6 m paraboloid	Line and continuum	B	70 GHz 72.84 GHz 88.63 GHz 90 GHz					
Nobeyama Observatory, University of Tokyo Nobeyama, Japan 35°56.0' N 138°29.0' E	1)8 m paraboloid	Solar spectrum	A	70-210 MHz					
	2)6 m paraboloid	Solar patrol	A	160.3 MHz					
	3)8+3 6 m EW + 4+2 6 m NS paraboloids	Solar EW, NS scans	A	160.3 MHz					
	4)12 1.2 m paraboloids	Solar EW scan	A	17 GHz					
Radio Astronomy Laboratory, Nagoya University Nagoya, Japan 35°08.0' N 136°58.4' E	1)16 50 cm paraboloids	Solar EW scan and Planets	A	35 GHz	80 MHz		Daylight 24	Continuous Variable	
Kagoshima Space Center, University of Tokyo Uchimoura, Japan 31°15.0' N 131°04.8' E	1.2 m paraboloid	Solar patrol	A	4995 MHz					
NETHERLANDS									
Dwingeloo Radio Observatory Dwingeloo, Netherlands 52°48.8' N 6°23.8'E	1)25 m paraboloid	Line and continuum	B	1407-1427 MHz	10 MHz	40° K	24	Variable	Periodic scheduling
		Line	B	1672-1720 MHz	10 MHz	40° K	24	Variable	Periodic scheduling
		Solar	A	160-320 MHz	10 MHz	2000° K	6-18 GMT	Variable	Periodic scheduling-60 channel spectrograph
	2)2x7.5 m paraboloid	Solar interferometer	A	243 MHz	200 KHz	400° K	6-18 GMT	Continuous	
	3)3.5 m paraboloid	Solar patrol	A	10.8 GHz	50 MHz		6-18 GMT		
	0.80 m paraboloid	Solar patrol	A	2.7 GHz	50 MHz		6-18 GMT		
Westerbork Radio Observatory Hooghalen, Netherlands 52°55.0' N 6°36.25' E	14x25 m paraboloid	Continuum and line polarization	B	610 MHz	0-10 MHz	350° K	24	Variable	Periodic scheduling
			B	1365-1425 MHz	0-10 MHz	85° K	24	Variable	Periodic scheduling
			B	4770-5020 MHz	0-10 MHz	115° K	24	Variable	Periodic scheduling
Nederhorst den Berg Observatory Nederhorst den Berg, Netherlands 52°14.1'N 5°04.6 E	1)10 m paraboloid	Solar	A	200 MHz	650 kHz	600° K	5-18 GMT	Continuous	
			A	610 MHz	1 MHz	2000° K	5-18 GMT	Continuous	
	2)1.8 m paraboloid	Solar	A	2980 MHz	5 MHz	2000° K	5-18 GMT	Continuous	
			A	9600 MHz	5 MHz	2500° K	5-18 GMT	Continuous	

*Information on frequencies for Japanese stations was provided by the Research Institute of Atmospherics, Nagoya University, and for the Netherlands' stations by the Netherlands Foundation for Radio Astronomy.

SUMMARY OF FREQUENCIES BEING MONITORED FOR RADIO ASTRONOMY OBSERVATIONS

(Foreign Observatories)

Name and Location	Telescope	Type of Observation	Class of Observation	Frequency*	Bandwidth	Noise Temperature	Hours of Reception	Dates of Operation	Remarks
NORWAY									
Observatory of the University of Oslo Harestua, Norway 60°12.5' N 10°45.5' E	1)7.6 m paraboloid		A	157.5 MHz	35 MHz	1500° K	Daylight		
			A	225 MHz	1.5 MHz	1000° K	Daylight		
	2)9.1 m paraboloid		A	320 MHz	40 MHz	1500° K	Daylight		
	3)Three mattress antennas		A	200 MHz	1 MHz	1000° K	Daylight		
	4)Telescope not identified		A	159 MHz					
			A	318 MHz					
			A	500-550 MHz					
PHILIPPINES									
Manila Observatory Quezon City, Philippines 14°38' N 121°05' E	1)2.44 m paraboloid	Solar patrol	B	1385 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	1445 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	2665 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	2725 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	4965 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	5025 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	8770 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	8830 MHz	16 MHz	1000° K	Daylight	Continuous	
	2)3.0 m paraboloid	Solar patrol	B	580 MHz	16 MHz	1000° K	Daylight	Continuous	
			B	640 MHz	16 MHz	1000° K	Daylight	Continuous	
	3)Interferometer	Solar patrol	A	24-48 MHz	20 kHz	1500° K	Daylight	Continuous	Sweep
POLAND									
Astronomical Observatory Torun-Piwnice, Poland 53°05' N 18°33' E	1)Two cylindrical parabloids 4 x 8 m		A	127 MHz	50 kHz	520° K	8-16 GMT		
	2)Two corner reflectors 1400 m E-W		A	32.5 MHz	25 kHz	600° K	7-20 GMT		
	3)Two corner reflectors 220 m E-W		A	127 MHz	4 MHz	700° K	7-20 GMT		
	4)Two log-periodic serials 20 m E-W		A	327 MHz	4 MHz	1600° K	8-16 GMT		
SPAIN									
Observatorio del Ebro Roquestas (Tarragona) 40°49.2' N 0°29.5 E	2.4 m paraboloid dish	Solar patrol	A	1.5 GHz	16 MHz		Daylight	Continuous	
				2.7 GHz	16 MHz				
				5.0 GHz	16 MHz				
SWEDEN									
Kiruna Geofysiska Observatorium Kiruna, Sweden 67°50' N 20°25' E	1)Two-element 60 m interferometer		A	50 MHz	100 kHz	130° K			
	2)Three-element Yagi		A	27.6 MHz	30 kHz	1700° K			
Onsala Space Observatory Onsala, Sweden 57°23.6' N 11°55.2' E	25.6 m paraboloid	Spectral line (including line searches)	B	1000-1100 MHz	5 MHz	30° K	24	Variable	TW maser
			B	1420 MHz	5 MHz	175° K	24	Variable	Paramp
			B	1550-1780 MHz	6 MHz	25° K	24	Variable	TW maser
			B	2850-3600 MHz	12 MHz	35° K	24	Variable	TW maser
			B	4300-5200 MHz	12 MHz	40° K	24	Variable	TW maser
			B	5100-6250 MHz	20 MHz	45° K	24	Variable	TW maser
		Very long baseline interferometer	B	1600-1720 MHz	2 MHz	25° K	24	Variable	TW maser
			B	4700-5000 MHz	2 MHz	40° K	24	Variable	TW maser
			B	(7840) MHz	2 MHz		24	Variable	TW maser

*Information on frequencies was provided by the Operating Administrations, except information on the Kiruna station was obtained from the ITU List of Stations.