

Friends of the Bracewell Observatory Association

567 CANYON ROAD, REDWOOD CITY, CA 94062
PH. 650-888-2372 FAX: 650-365-6906

FAX Transmittal

To: Santa Clara County Building **From:** Bob Lash, M.D.
Inspection Office

Fax: (408) 299-4769 **Date:** 11/8/05

Re: Identification of Properties **Pages:** 18 (including coversheet)
For Potential Historical
Significance

Assessor Parcel No. #
14215007

**IDENTIFICATION OF PROPERTIES FOR
POTENTIAL HISTORIC SIGNIFICANCE**

Please complete and submit this form along with your building permit application for demolition to the Santa Clara County Building Inspection Office.

1. **Property location:** 3185 Alpine Road
Street Address
Menlo Park, CA 94028 14215007
City/State Zip Code Assessor Parcel No. (APN)

6. **Is the proposed demolition related to a land development application (i.e. Grading, Special Permit, ASA) already submitted, or to be submitted, to the County?** Yes No

3. **If yes, include land development application file number:** -

4. Santa Clara County [Residential Unit] Property Record:

All applicants are required to submit a property appraisal record to document the age of the property. Obtain a copy from the Assessor's Office on the 3rd floor of the East Wing, 70 West Hedding Street. If obtained by a representative of the property owner, said representative must present written permission by the owner allowing the Assessor's Office to release the property appraisal record.

5. **Is the property 50 years or older?** Yes No

Please note that the 50-year age reference is a discretionary guideline; there are circumstances where a property less than 50 years old may be potentially significant and applicants may be required to submit supplemental documentation.

(Note: Portions of the resource are 50 years old, but the primary extant resource is not, although it is integrally related in function and history.)

If yes, applicants are required to submit:

- a. Part II of the Identification of Properties for Potential Historic Significance form; and
- b. Photographs of each elevation of the subject property and any related outbuildings and/or associated features.

c. **Date of construction (based upon submitted property record):**
1955

d. **Has this property received any historic designation(s)?** Yes No

If yes, check the boxes that apply and attach the nomination form or documentation related to its listing.

- | | |
|--|---|
| <input type="checkbox"/> National Register of Historic Places | <input type="checkbox"/> California Historical Landmark |
| <input type="checkbox"/> Santa Clara County Heritage Resources Inventory | <input type="checkbox"/> State Point of Historic Interest |
| <input type="checkbox"/> California Register of Historical Resources | <input type="checkbox"/> Historical Zoning District |

8. Signature:

By signing this application, I hereby acknowledge that the information contained herein, or subsequently submitted, is true and correct to my knowledge.

Robert Lash, M.D. 11/8/05
Signature of property owner or representative * Date

Robert Lash, M.D. 11/8/05
Print name of property owner or representative * Date

President, Friends of the Bracewell Observatory Association

For Internal Use Only: Plan Check No. _____

* Submitted on behalf of the Friends of the Bracewell Observatory Association, a non-profit 501(c)(3) Corporation located at 567 Canyon Rd., Redwood City, CA 94062

PART II

IDENTIFICATION OF PROPERTIES FOR POTENTIAL HISTORIC SIGNIFICANCE

If the property is 50 years or older and/or a designated historical resource, complete the following questions which will assist the Planning Office in making a preliminary determination whether the property potentially meets the threshold of significance according to the California Environmental Quality Act (CEQA). Properties that are eligible for listing in the California Register of Historical Resources must be given consideration in the CEQA process. Please note that the 50-year age reference is a discretionary guideline; there are circumstances where a property less than 50 years old may meet the threshold of significance according to CEQA.

1. Property location: 3185 Alpine Road
Street Address
Menlo Park, CA 94028 14215007
City/State Zip Code Assessor Parcel No.

2. Have state historic resource inventory forms ever been completed for the property?
 Yes No If yes, attach a copy of the inventory form.

3. Property type: (check one) Residential Agricultural Commercial
 Industrial Religious Other Academic

4. Name of architect or builder: (if known) Ronald N. Bracewell

5. Architectural style: Unique

6. Number of stories: One One and one-half Two
 Two and one-half Three Four Over four _____

7. Principal building materials: Roof Metal
Exterior walls Metal Foundation Concrete

8. Roof type: Hip Front/side/cross gable Flat Shed Gambrel

9. List any outbuildings and associated features located on the property, and their dates of construction (i.e. garage, barn, shed, corral, chicken house, cistern/well, tank house, fountain, architect-designed landscape, orchard):

32 concrete piers bearing historical signatures, 1955
5 60-foot radio telescope antennas, 1966
Control room building & combiner shed, 1966

10. Has the property and/or associated feature(s) ever been altered or moved?
 Yes No

If yes, summarize the history of any physical changes to the property, including significant alteration dates. From what location was the structure moved?

For questions 11 - 14 below, attach an explanation why each criterion does or does not apply to the property. Consult National Register Bulletin 15 for assistance. The publication is available online at http://www.cr.nps.gov/nr/publications/bulletins/nr15_toc.htm.

11. Does the property have any known association with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States?

Yes No

12. Does the property have any known association with the lives of persons important to local, California, or national history?

Yes No

13. Does the property retain distinctive characteristics of a type, period, region, or construction method, or represent the work of a master or possess high artistic values?

Yes No

14. Has the property yielded or does it have the potential to yield information important to the prehistory or history of the local area, California or the nation?

Yes No

15. **Photographs:**

Attach a minimum of four (4) color or black and white 4" x 6" photographs depicting each elevation of the property, and any related outbuildings and/or associated features.

For Internal Use Only:

Plan Check No. _____

Attachment for questions 11 – 14, with explanation as to why each criterion applies:

The Bracewell Radio Astronomy Observatory meets the following eligibility criteria as a historic resource that is significant at the local, state, and national level:

1. It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States.

One of the most important events in the 20th century in the history of medical science was the advent of CT Scan (Computed Tomography) medical imaging. The Bracewell Radio Astronomy Observatory is widely recognized as its birthplace. Millions of lives have been saved as a direct result of these dishes at 3185 Alpine Road.

2. It is associated with the lives of persons important to local, California, or national history.

*The Bracewell Observatory is associated with the life of Stanford Professor Ronald N. Bracewell. In 1955 Professor Bracewell founded the observatory, co-authored the first book on Radio Astronomy (R.N. Bracewell and J.L. Pawsey, Oxford, 1955), pioneered image reconstruction, and today he **recognized worldwide as a leading historical figure in the history of Radio Astronomy and the history of Medical Imaging** (see Sullivan, W.T., *The Early Years of Radio Astronomy: Reflections fifty years after Jansky's Discovery*, Cambridge Press).*

3. It embodies the distinctive characteristics of a type, period, region, or method or construction, or represents the work of a master, or possesses high artistic values.

The Bracewell Observatory radio telescope dishes were personally designed by a significant historical figure, Professor Ronald N. Bracewell, and are not merely rare, they are one-of-a-kind. In April of 2005, The International Astronomical Union's (IAU) Inter-Union Commission for the History of Astronomy (ICHA), which was tasked with identifying and listing "historically significant radio telescopes", has designated Stanford's 60-foot dishes as "historically significant" and published information about them in their bulletin. See IAU / ICHA Newsletter No. 7, April 2005, pp. 8-9. The IAU is an international body consisting of 63 member nations, including the United States.

4. The property has yielded, and has the potential to yield, information important to the prehistory or history of the local area, California, or the Nation:

Several years ago Professor Bracewell dug up a human jawbone while planting a tree at the Observatory. He gave it to Professor Gerow, now deceased, and showed him where the planting soil had been scraped up alongside San Francisco creek, on the East bank. Professor Gerow's archeology students partially excavated the area. They found mortars for grinding seeds, stone tools and chert arrowheads, white cone shells carried up from the Bay mudflats, all with a holes bitten off at the point, elk shoulder-blades, and human bones.

State of California — The Resources Agency
 DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
 HRI #
 Trinomial
 NRHP Status Code

Other Listings
 Review Code

Reviewer

Date

Page 1 of 13

*Resource Name or #: Bracewell Observatory

P1. Other Identifier: Stanford Field Site 515. Historic name: Heliopolis.

***P2. Location:** Not for Publication Unrestricted

***a. County:** Santa Clara

and (P2b and P2c or P2d. Attach a Location Map as necessary.)

***b. USGS 7.5' Quad:** (See DPR523J Attached)

Date: T ; R ; ¼ of ¼ of Sec ; M.D. B.M.

c. Address: 3185 Alpine Road

City: Menlo Park

Zip: 94028

d. UTM: Zone: 10S ; 571841 mE/ 4139371 mN (G.P.S.)

e. Other Locational Data: (e.g., parcel #, directions to resource, elevation, etc., as appropriate)

Assessor's Parcel Number 14215007

Longitude: 122 deg 11.3 min West, Latitude: 37 deg 23.9 min North

***P3a. Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries)

The Bracewell Observatory consists of two major elements. The first element is a radio telescope consisting of 32 10-foot dish antennas, of which the 32 concrete dish mounting piers remain, and the second element is a radio telescope consisting of 5 60-foot dish antennas, 1,500 square foot control room, and 500 square foot antenna signal combiner shed, all of which are currently fully intact at the time of this report. The dishes are of unique design by Radio Astronomy pioneer Professor R.N. Bracewell, and are of aluminum and steel construction. For information regarding the historical significance of these telescopes, please see the attached Building, Structure, and Object Record (DPR523B).

***P3b. Resource Attributes:** (List attributes and codes) AH15. Standing Structure; AH10. Machinery

***P4. Resources Present:** Building Structure Object Site District Element of District Other (Isolates, etc.)

P5a. Photo or Drawing (Photo required for buildings, structures, and objects.)



P5b. Description of Photo: (View, date, accession #)

View looking southwest, 1972

***P6. Date Constructed/Age and Sources:** Historic

Prehistoric Both

***P7. Owner and Address:**

Stanford University
 Building 10
 Stanford, CA 94305-2060

***P8. Recorded by:** (Name, affiliation, and address)

B. Lash
 Friends of the Bracewell
 Observatory Association
 567 Canyon Road
 Redwood City, CA 94062

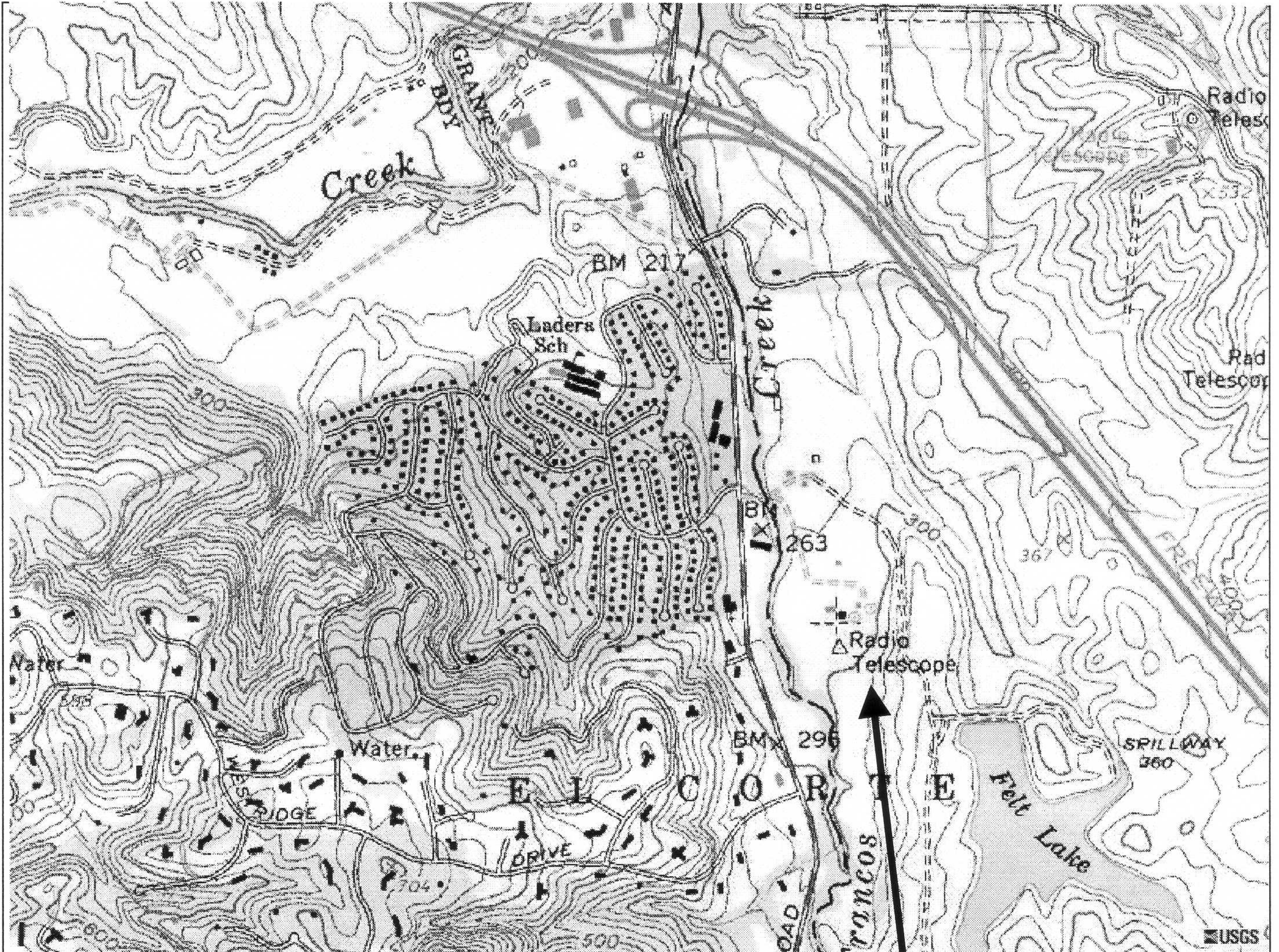
***P9. Date Recorded:** 9/25/05

***P10. Survey Type:** (Describe):

California Register nomination

***P11. Report Citation:** (Cite survey report and other sources, or enter "none.") None

***Attachments:** NONE Location Map Sketch Map Continuation Sheet Building, Structure, and Object Record
 Archaeological Record District Record Linear Feature Record Milling Station Record Rock Art Record
 Artifact Record Photograph Record Other (List):



Site

BUILDING, STRUCTURE, AND OBJECT RECORD

*Resource Name or # (Assigned by recorder) Bracewell Observatory

- B1. Historic Name: Heliopolis
- B2. Common Name: Bracewell Observatory, Stanford Field Site 515
- B3. Original Use: Radio Astronomy Observatory
- B4. Present Use: Radio Astronomy Observatory (currently inactive)
- *B5. **Architectural Style:** Unique (These five 60 foot radio telescope dishes are of a unique design by R.N. Bracewell)
- *B6. **Construction History:** (Construction date, alterations, and date of alterations)
1955 – 1959 Construction of first Bracewell Radio Telescope (32 10-foot dish interferometer)
1966- 1972 Construction of second Bracewell Radio Telescope (5 60-foot dish interferometer)

*B7. Moved? No Yes Unknown Date: N/A Original Location: N/A

*B8. **Related Features:**

Thirty two concrete mounting piers bearing hammer and chisel signatures of 180 distinguished visitors
Control Room (Butler building, 1500 sq ft., constructed circa 1966)
Antenna Combiner Shed (500 sq ft., constructed circa 1966)
Forty species of eucalyptus trees personally planted by R.N. Bracewell

B9a. Architect: Ronald N. Bracewell

b. Builder: Stanford Radio Astronomy Institute (built on-site by staff)

*B10. **Significance: Theme:** Pioneering Radio Astronomy Observatory **Area:** Unincorporated Santa Clara County
Period of Significance: 1955 – 2005 **Property Type:** Academic **Applicable Criteria:** None
(Discuss importance in terms of historical or architectural context as defined by theme, period, and geographic scope. Also address integrity.)

The subject site was constructed by the Stanford Radio Astronomy Institute (SRAI), which was founded in 1955 by Professor Ronald N. Bracewell, the Lewis M. Terman Professor of Electrical Engineering, Emeritus at Stanford, who served as its first director. SRAI is known today as Stanford's Space, Telecommunications, and Radioscience Laboratory (STAR Lab).

In 1955 Professor Bracewell co-authored the first book on Radio Astronomy (R.N. Bracewell and J.L. Pawsey, Oxford, 1955), and today he **recognized worldwide as a leading historical figure in the history of Radio Astronomy and the history of Medical Imaging** (see Sullivan, W.T., The Early Years of Radio Astronomy: Reflections fifty years after Jansky's Discovery, Cambridge Press).
(Continued on next page, DPR523L)

B11. Additional Resource Attributes: (List attributes and codes)
(AH15) - Standing Structure; (AH10) - Machinery

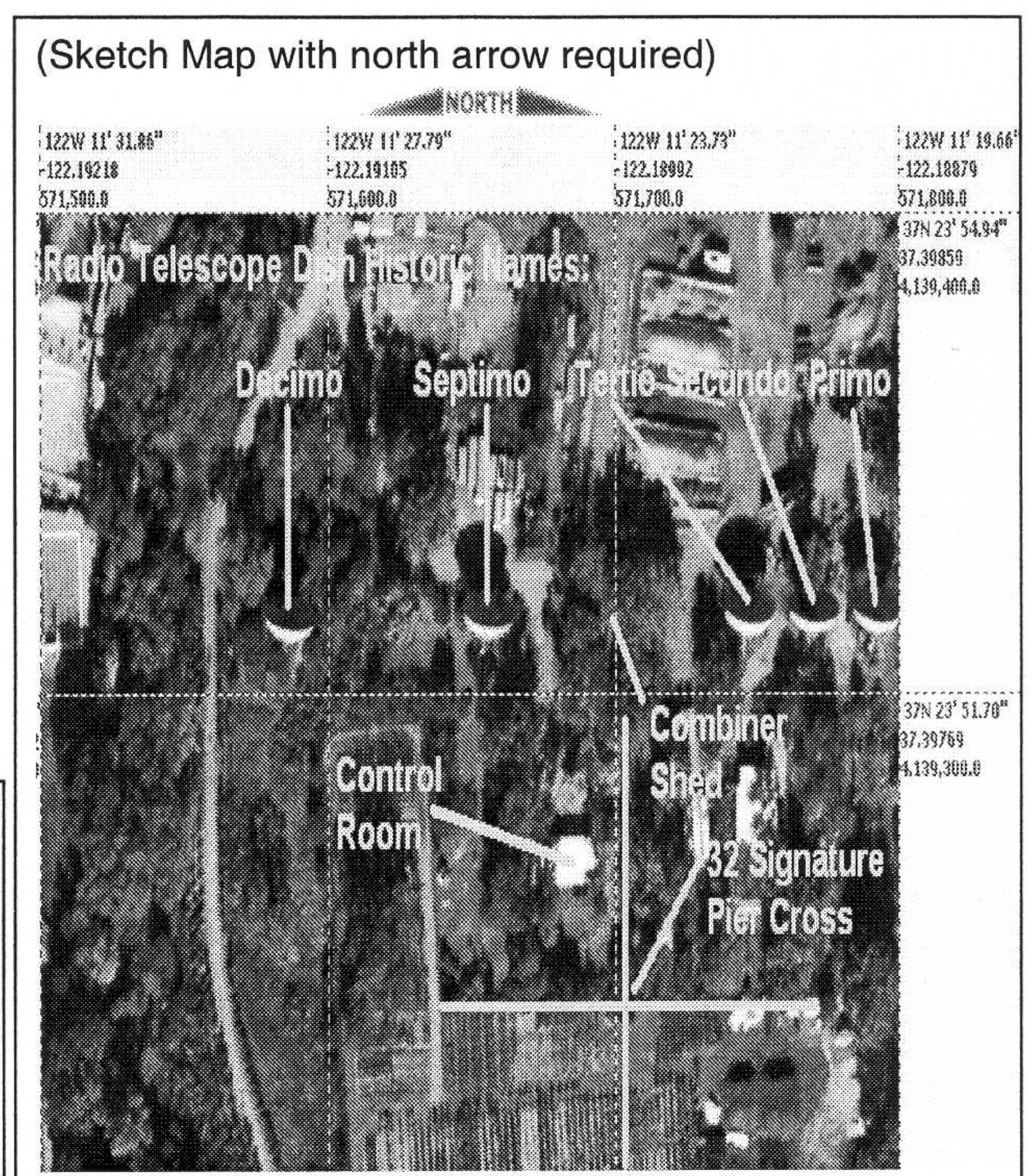
*B12. **References:**
(See page 12, DRP523L)

B13. **Remarks:**
Stanford University has applied for a demolition permit for this historic resource, which is currently undergoing historic review.

*B14. **Evaluator:** Bob Lash, President, Friends of the Bracewell Observatory Association

*Date of Evaluation: 9/25/05

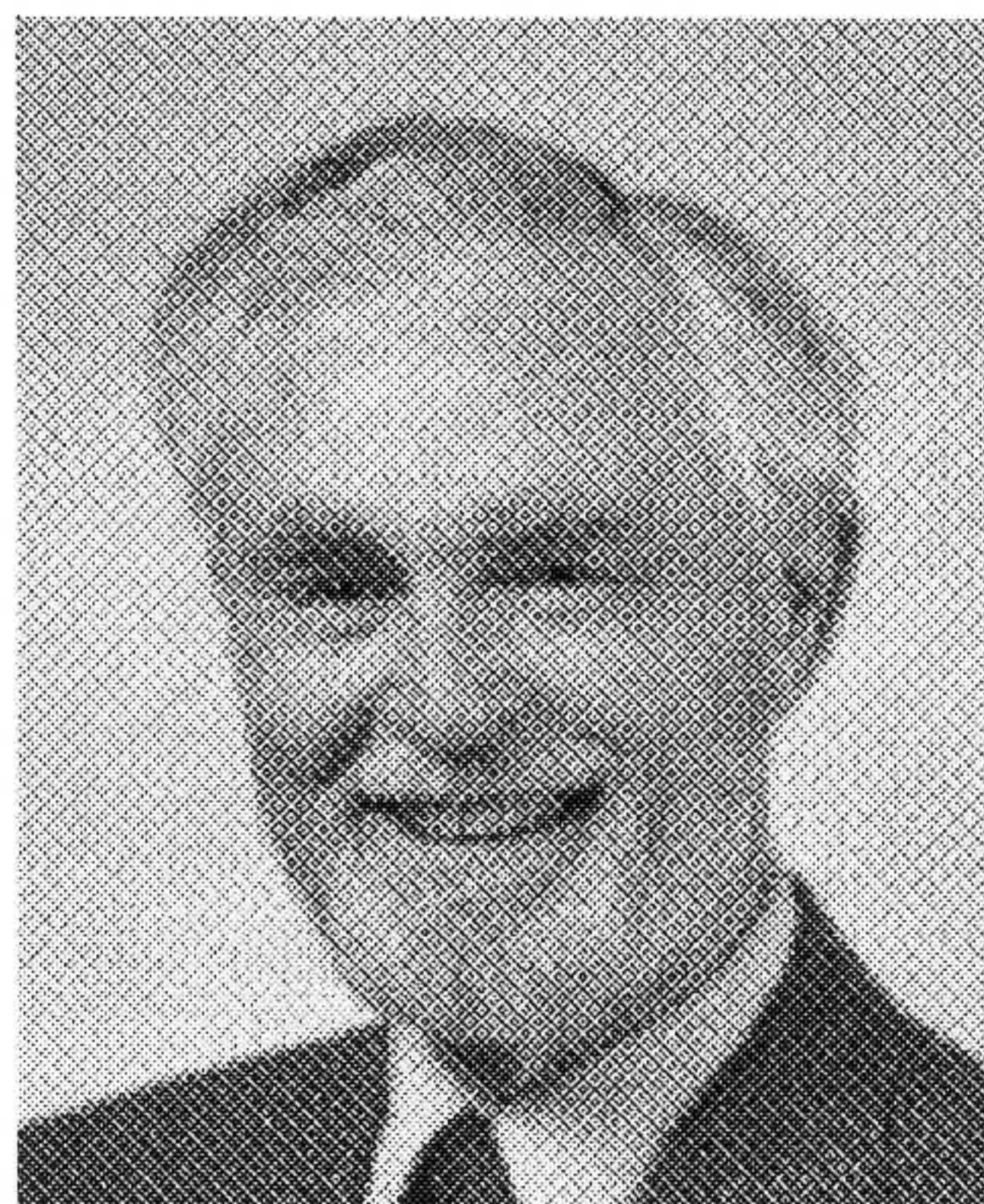
(This space reserved for official comments.)



*Recorded by: B. Lash

*Date: 9/25/05

Continuation Update



Professor Ronald N. Bracewell

Born in Sydney, Australia in 1921, Professor Bracewell graduated from the University of Sydney in 1941 with the B.Sc. degree in mathematics and physics, later receiving the degrees of B.E. (1943), and M.E. (1948) with first class honors. During World War II he designed and developed microwave radar equipment in the Radiophysics Laboratory of the Commonwealth Scientific and Industrial Research Organization, Sydney under the direction of J.L. Pawsey and E.G. Bowen and from 1946 to 1949 was a research student at Sidney Sussex College, Cambridge, engaged in ionospheric research in the Cavendish Laboratory, where he received his Ph.D. degree in physics under J.A. Ratcliffe.

For experimental contributions to the study of the ionosphere by means of very low frequency waves, Dr. Bracewell received the Duddell Premium of the Institution of Electrical Engineers, London in 1952.

In 1992 he was elected to foreign associate membership of the Institute of Medicine of the U.S. National Academy of Sciences (1992), the first Australian to achieve that distinction, **for fundamental contributions to medical imaging**.

He was one of Sydney University's three honorees when alumni awards were instituted in 1992, with a **citation for brain scanning**.

Then, in 1994, he was the recipient of the Institute of Electrical and Electronic Engineers' Heinrich Hertz gold medal for pioneering work in antenna aperture synthesis and image reconstruction as applied **to radio astronomy and to computer-assisted tomography (CT scanning)**.

In 1998 Dr. Bracewell was named **Officer of the Order of Australia (AO)** for "distinguished service of a high degree to... humanity at large" for his service to science in the fields of **radio astronomy and medical image reconstruction**.

*Recorded by: B. Lash

*Date: 9/25/05

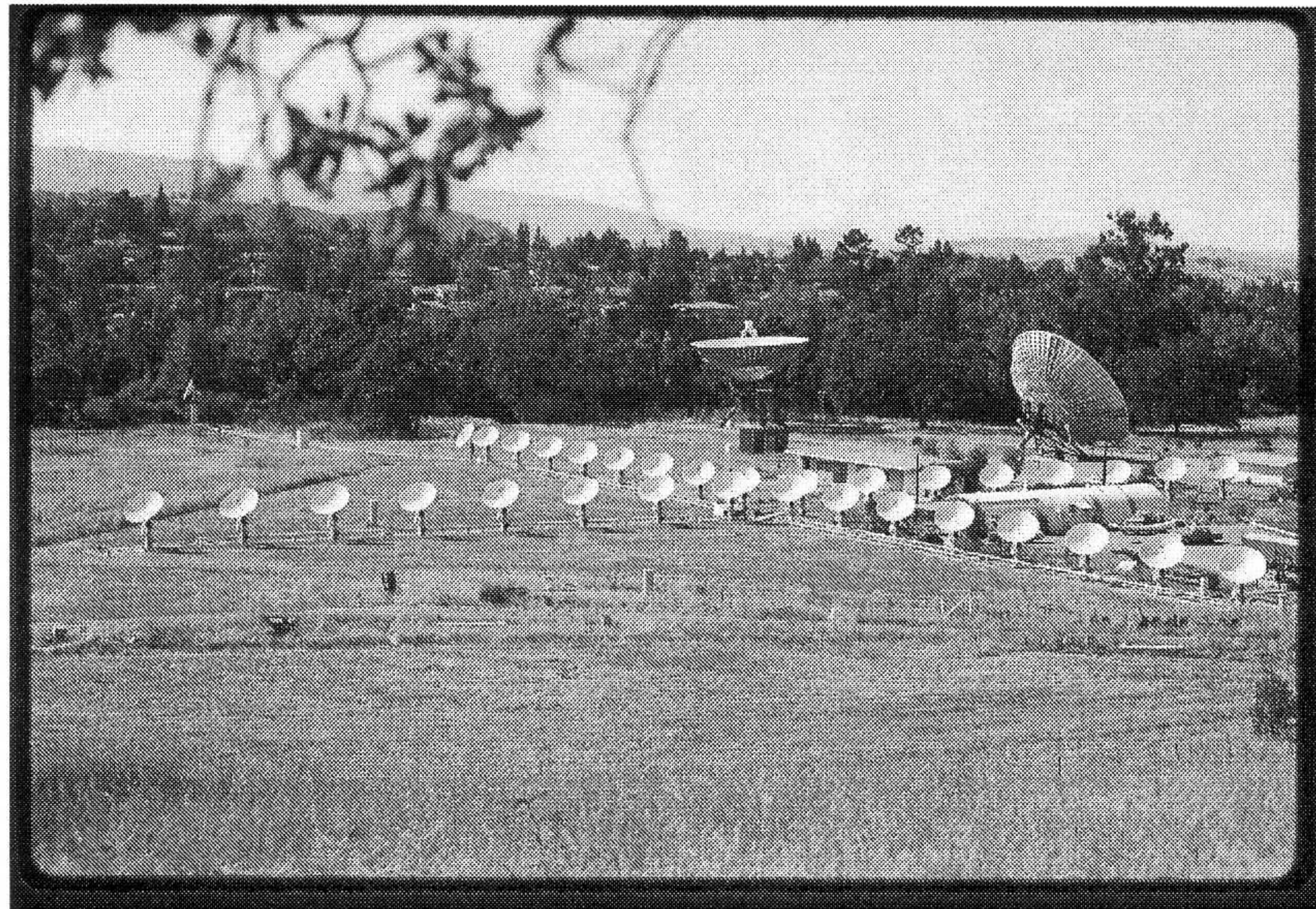
Continuation Update



*Officer of the Order of Australia for
“distinguished service of a high degree to... humanity at large”*

Heliopolis (Stanford Field Site 515): The Birthplace of CT Scan Medical Imaging

In 1954, while an Assistant Professor of Astronomy at Berkeley, Professor Bracewell proposed the construction of what was to become a world-famous radio telescope at Stanford, and carried out its initial design. He then came to Stanford to fulfill his vision.



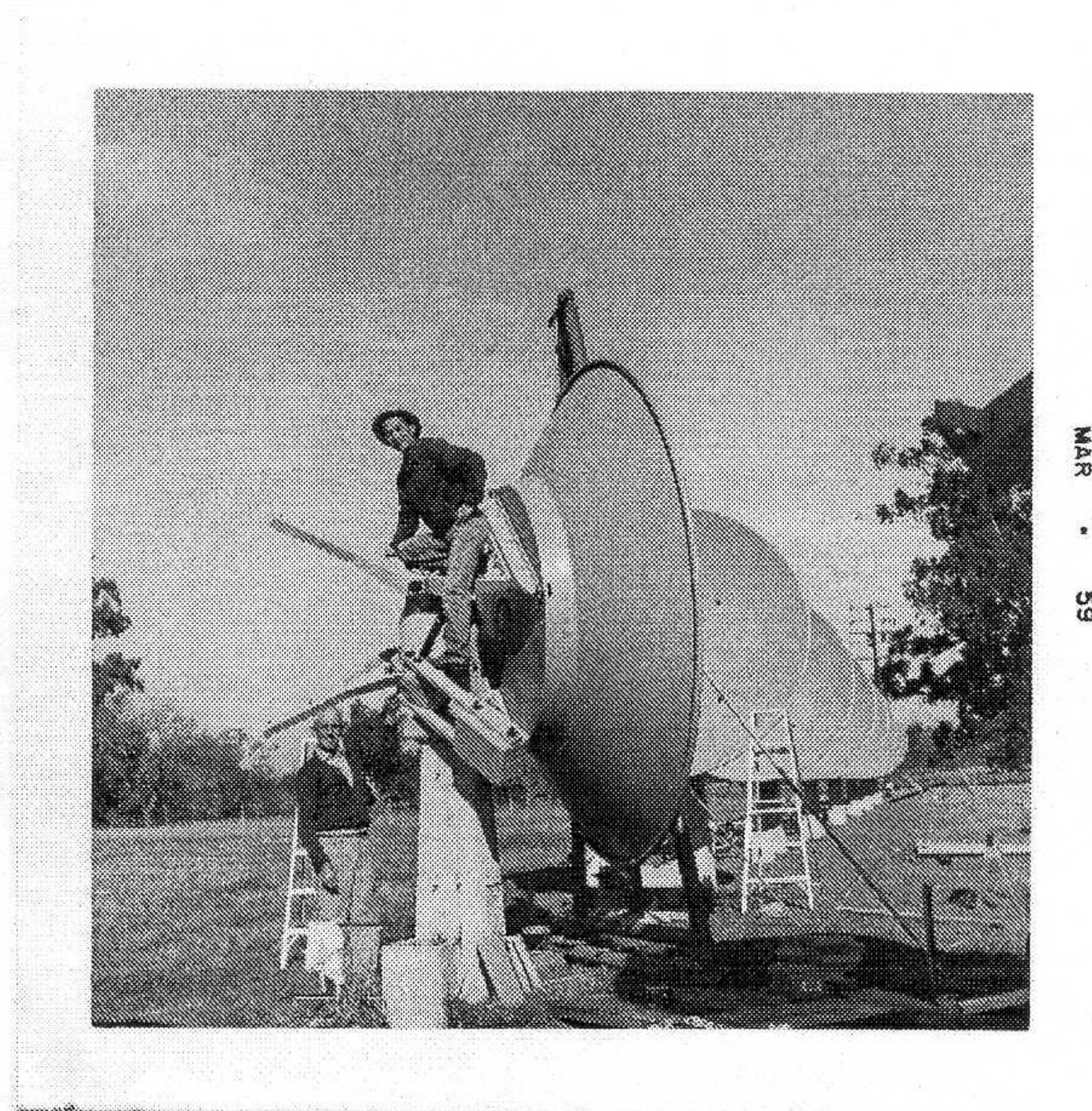
The Stanford 32-Element Cross Interferometer at Heliopolis (Site 515)

In 1955 construction began of this 9.1 cm microwave spectroheliograph consisting of 32 ten-foot dish antennas, mounted on concrete piers, in a cross-shaped array to create high resolution maps of the face of the sun in the microwave spectrum. The site became known as “**Heliopolis**” because of this solar imaging research. Construction was carried out from 1955 to 1959.

*Recorded by: B. Lash

*Date: 9/25/05

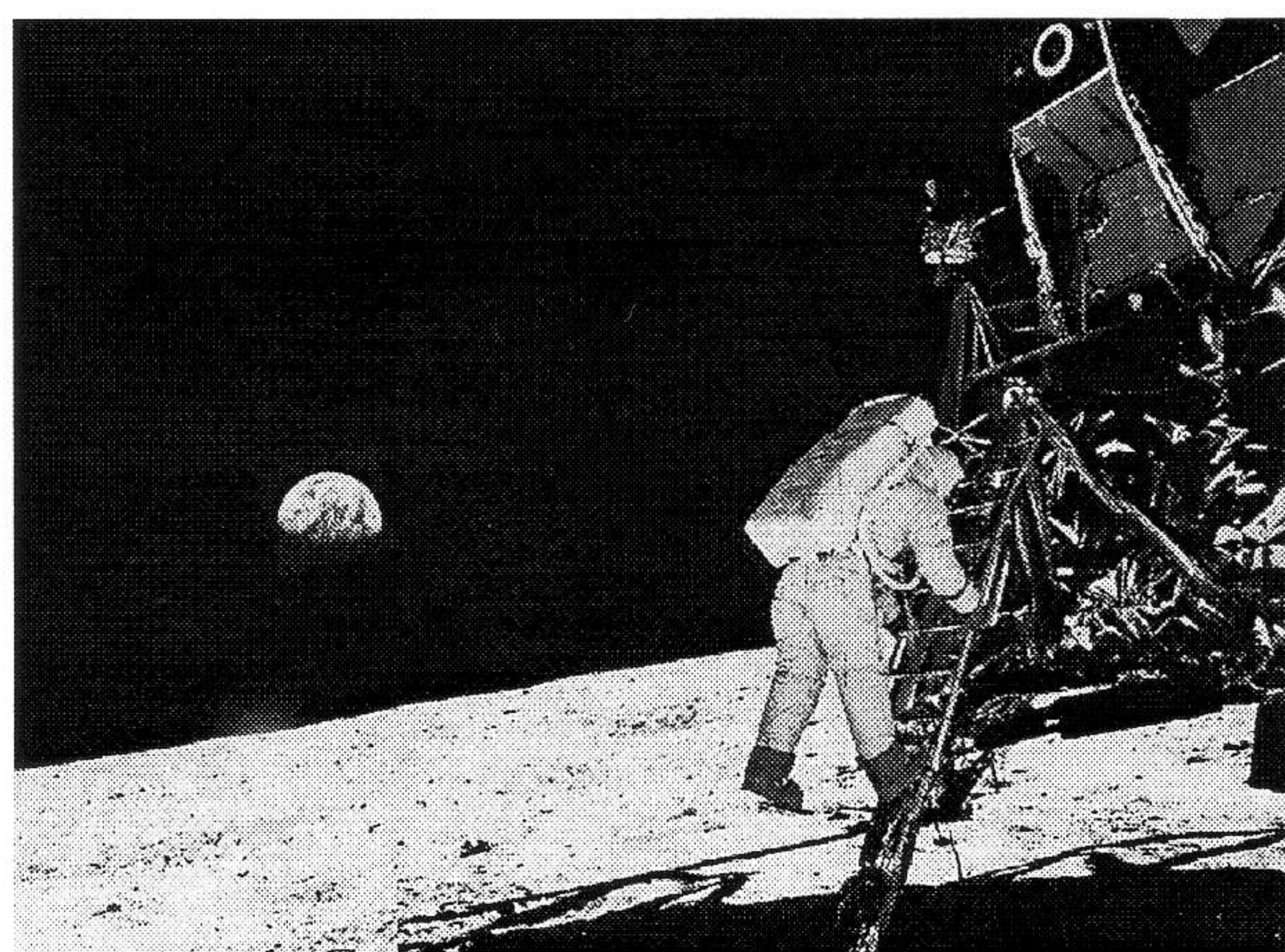
Continuation Update



Construction of the 32-dish array, 1955-1959

Funded by the Air Force Office of Scientific Research, the array produced 11 years of detailed daily maps of the face of the sun in a virtually unbroken sequence from 1962 to 1973, completing one full solar cycle, and was the first radio telescope to achieve the resolution of the human eye.

The National Oceanic and Atmospheric Administration (NOAA) widely disseminated these solar map observations in their Solar Geophysical Data Bulletins. NASA relied on these daily reports during the Apollo lunar missions for solar flare predictions to help the astronauts avoid potentially lethal radiation exposure.



Daily reports were transmitted from Heliopolis to NASA to protect Apollo astronauts from exposure to deadly solar flare radiation during lunar missions.

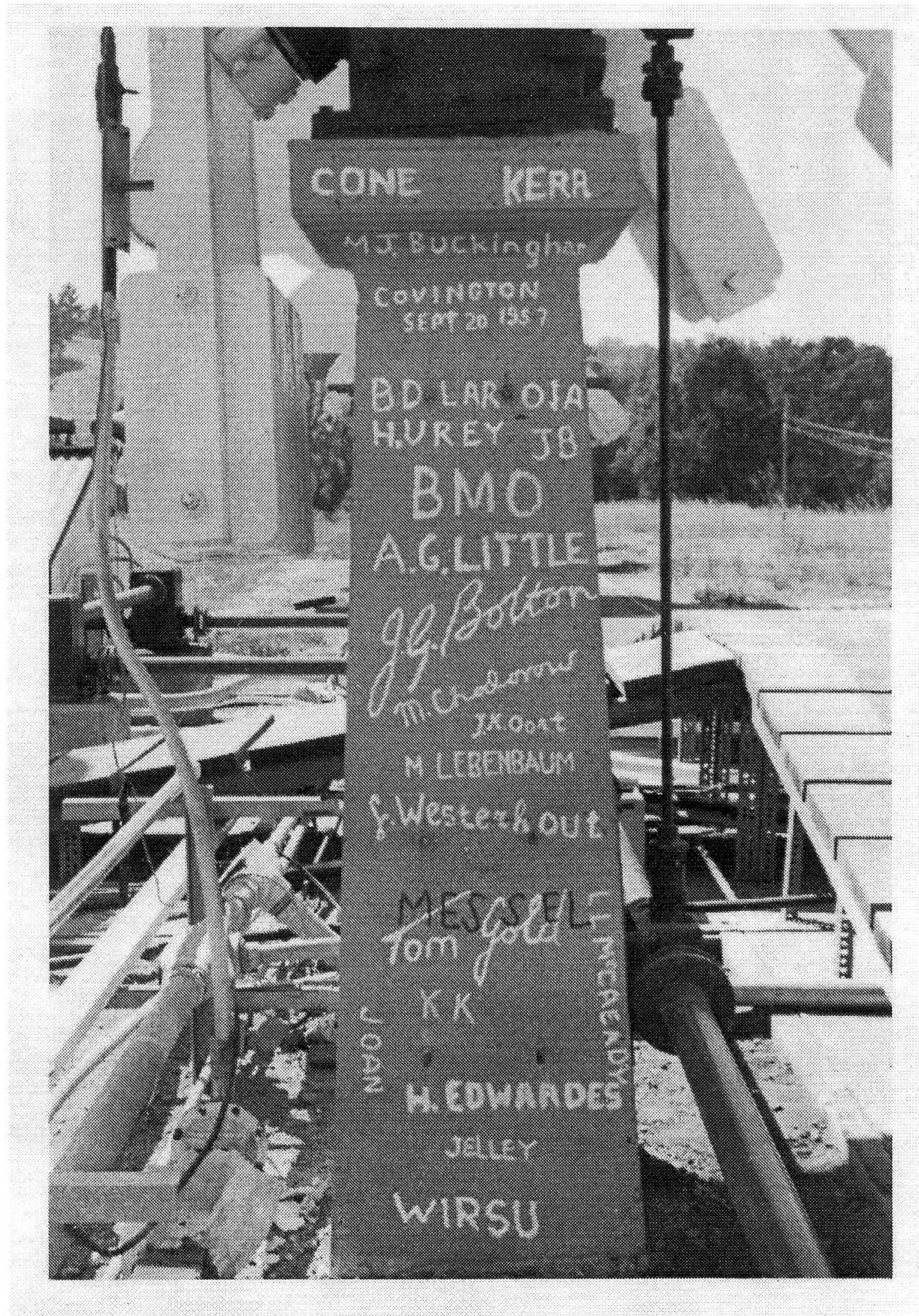
*Recorded by: B. Lash

*Date: 9/25/05

Continuation Update

In addition, this timely warning information about major solar flares was used worldwide, as such events disrupt global communications.

Although the 32 dishes were dismantled after 1973, their historical concrete mounting piers remain, bearing the signatures of many famous radio astronomers carved with hammer and chisel. For a complete list of signers, and their biographical information, please read Attachment E: "Famous Visitors to Heliopolis and their Hammer and Chisel Signatures."



Many of the remaining dish support piers bear the chiseled signatures of famous radio astronomers, including J.G. Bolton, who discovered the first four radio stars. A total of 189 historical autographs were carved by distinguished visitors during the past 50 years.



The Stanford Five Element Array, consisting of five 60-foot dishes, combiner building, and control room. Construction began in 1966.

By 1966 Professor Bracewell had begun the construction of a much larger and more powerful imaging radio telescope, capable of studying the structure, movement, and polarization of extragalactic sources at high resolution, as well as the sun, known as the Stanford Five Element Array. The system consists of five 60-foot diameter dish antennas arranged in a minimum-redundancy array, and uses the principle of fast earth rotation synthesis to create high resolution image maps of the sky at a wavelength of 2.8 cm (10.7 Ghz).

The array was designed and built from 1966 through 1972, by the Stanford Radio Astronomy Institute at a cost of \$2 million dollars (\$10.5 million in 2005 dollars), and was funded by the Air Force Office of Scientific Research and the National Science Foundation.

One of the most important discoveries made by this telescope was establishing the direction of motion of our solar system relative to the cosmic background.

In addition, the angular diameters, temperatures, and polarizations of numerous cosmic sources were studied, including radio galaxies, supernova remnants, planetary nebula, and H II hydrogen cloud regions.

*Recorded by: B. Lash

*Date: 9/25/05

Continuation Update

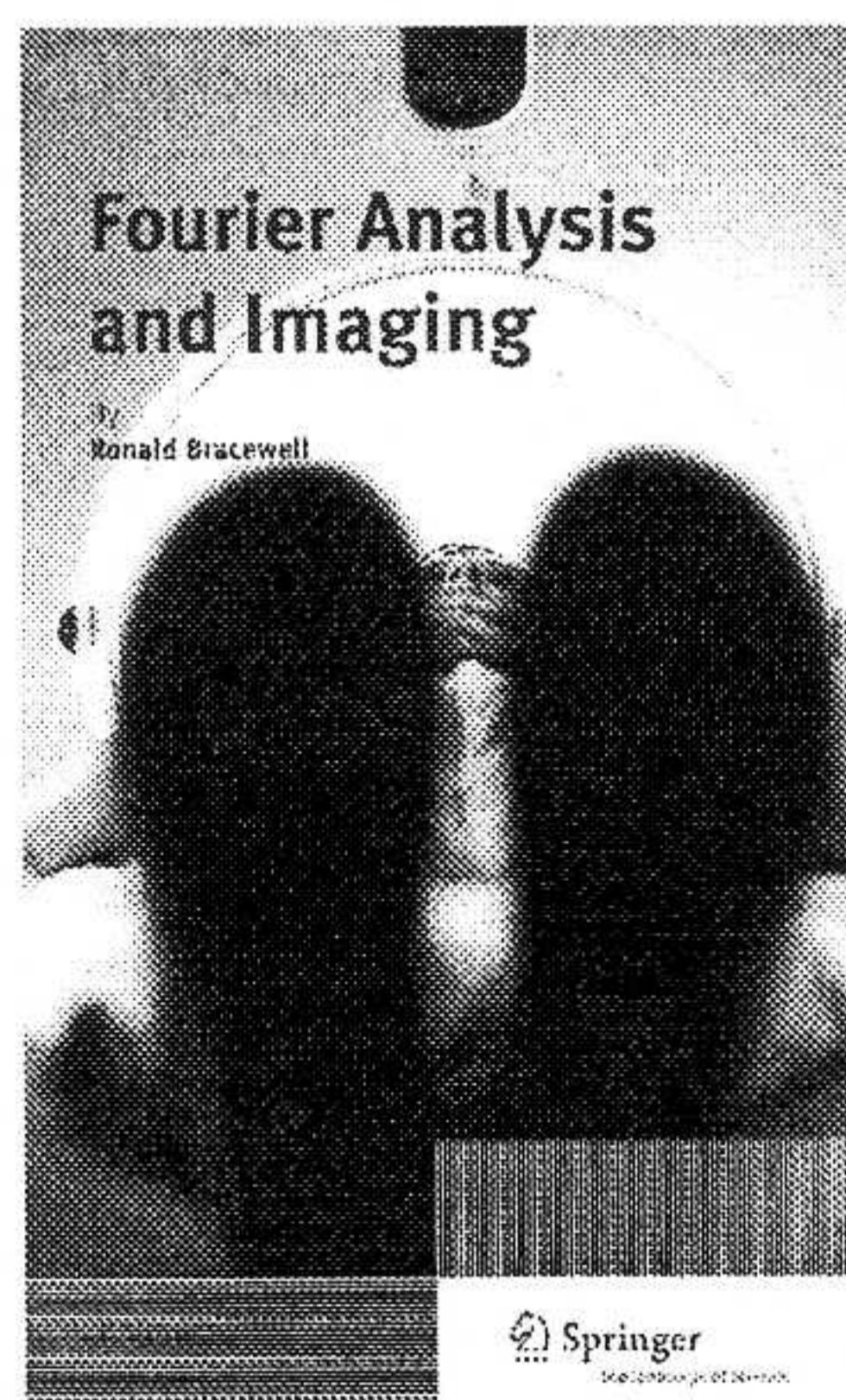
This second major radio telescope employed advanced concepts to achieve an angular resolution of 18 seconds of arc, and was applied to both solar and galactic studies. The calibration techniques for this leading-edge resolution passed into general use in radio interferometry via the medium of Stanford alumni.

The following major astronomical discoveries were made by the 5-Element Array:

- **A remarkable observational limit of 1.7 millikelvins, with considerable theoretical significance for cosmology, was set on the anisotropy in collaboration with Ph. D. student E.K. Conklin (1967).**
- **The correct theory of a relativistic observer in a blackbody enclosure (1968)**
- **Nulling interferometry - an antenna technique for suppressing the radiation from a star while accepting the radiation from a planet resembling the Earth which might a candidate for intelligent life.**
- **the absolute motion of the Sun at 308 km/s through the cosmic background radiation was measured by Conklin (1969), some years before independent confirmation.**

Both extragalactic and solar activity observations were conducted until 1979, when the National Science Foundation decided to cut off funding to individual university observatories, and concentrated all federal funds into a few "big science" national centers (the National Radio Astronomy Observatory in Greenbank, the Very Large Array in Socorro, and the Arecibo radio telescope in Puerto Rico).

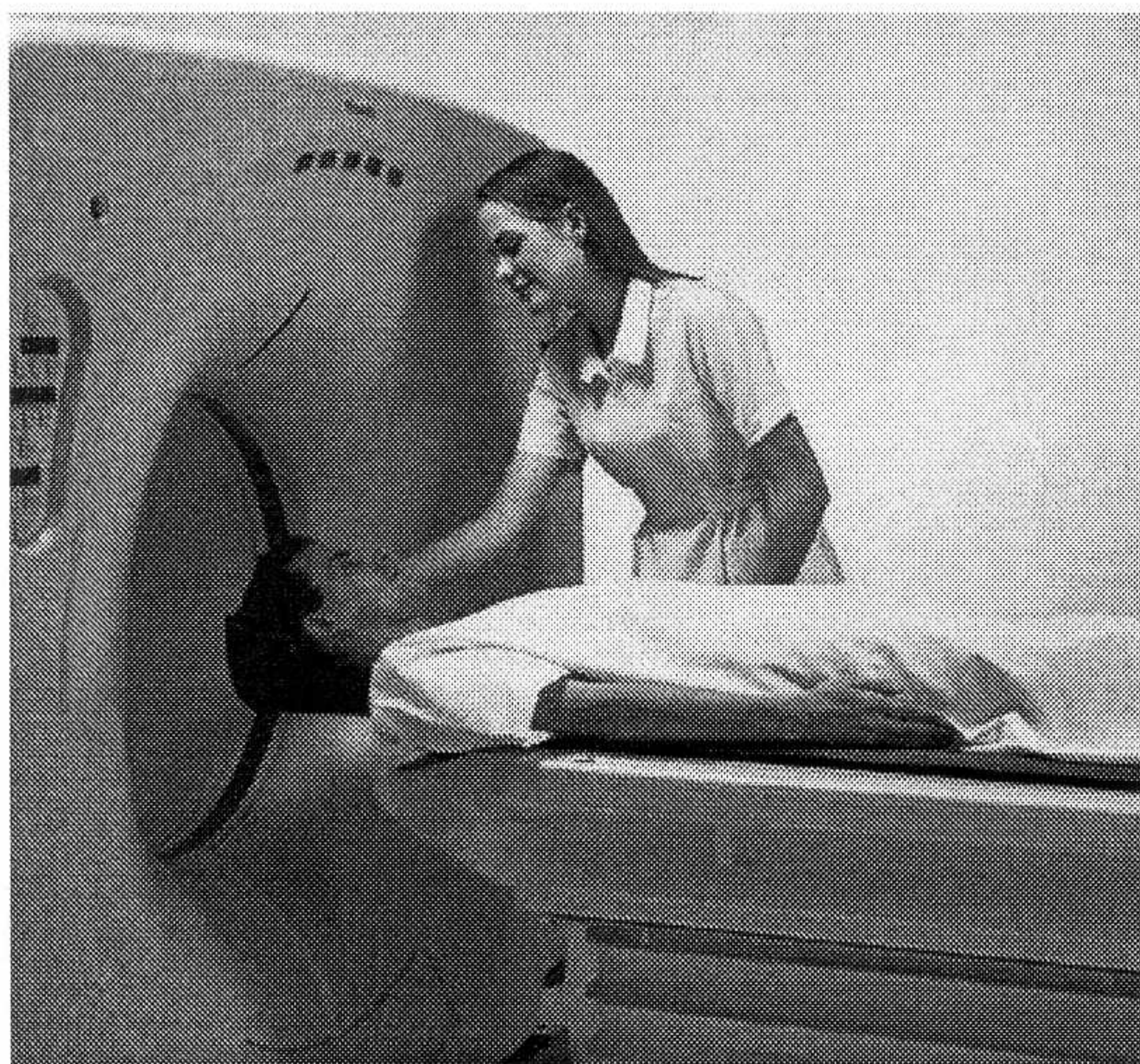
The development of the 32-dish and 5-dish telescope arrays at **Heliopolis advanced the state of the art in medical diagnosis**. The image reconstruction mathematical methods developed by Professor Bracewell for these arrays were universally adopted into the algorithms of CAT Scanners.



Above: An authoritative text book on CT scan imaging written by Professor Bracewell, entitled "Fourier Analysis and Imaging" (Springer Press)

In 1967, Professor Bracewell published in the *Astrophysical Journal* (Vol. 150, No. 2) the numerical algorithm for tomographic image reconstruction which had its roots in both the 32-dish and 5-dish arrays.

Godfrey Newbold Hounsfield at Electrical and Musical Industries (EMI), UK learned of Professor Bracewell's image reconstruction algorithm and decided to build hardware to implement it into a commercial product. EMI was the company that developed the antennas for public TV broadcasting in England before WWII and where Joe Pawsey gained the antenna know how that he imparted to Professor Bracewell in the 40s. These machines were first sold by EMI at a million dollars each to hospitals in the US.



The CT Scan Medical Imaging System can create detailed 3D views inside of the human body, directly incorporating the reconstruction method originated and refined for the dish arrays of Heliopolis

Millions of lives have been saved around the world as a direct result of these dishes at 3185 Alpine Road. These structures, personally designed by a significant historical figure, are not merely rare, they are one-of-a-kind.

Stanford University itself has a permanent historical exhibit about the Bracewell Observatory on display in the lobby of its David Packard Building. The exhibit features photos of the dishes, as well as photos of CT Brain Scan images, and describes how the field of Computed Tomography Medical Imaging originated from these dishes.

In April of 2005, The International Astronomical Union's (IAU) Inter-Union Commission for the History of Astronomy (ICHA), which was tasked with identifying and listing "historically significant radio telescopes", has designated Stanford's 60-foot dishes as "historically significant" and published information about them in their bulletin. A copy of the IAU / ICHA Newsletter (No. 7, April 2005, pp. 8-9) is attached as Attachment F. The IAU is an international body consisting of 63 member nations, including the United States.

*Recorded by: B. Lash

*Date: 9/25/05

Continuation Update

International Astronomical Union International Union of the History
and Philosophy of Science



THE ICHA NEWSLETTER
NEWSLETTER OF THE INTER-UNION COMMISSION FOR
HISTORY OF ASTRONOMY

No. 7 - April 2005

SUMMARY

A. The IAU Historic Radio Astronomy Working Group. 2: Progress Report ... 2

*The International Astronomical Union's Inter-Union Commission for the History of Astronomy
has designated the 60-foot dishes at Heliopolis "historically significant."*

The Friends of the Bracewell Observatory Association (FBOA), a non-profit 501(c)(3) organization, was founded to preserve and present the history of the scientific contributions made at this site, and to fund the restoration and maintenance of the observatory for the benefit of Stanford faculty and students.

FBOA has 65 volunteers who have begun scanning and archiving hundreds of historical documents and photos, and has developed a restoration and maintenance plan. In addition to funding the maintenance of the artifacts, grounds, and facilities, we will provide docents to lead historical pier walks, observatory tours, and provide educational materials to Stanford visitors. In addition, a documentary film is being prepared which will be made available to schools as well as the public at large.

In a recent letter to Stanford Ombudsman David Rasch, science historian William Glen writes:

To: rasch@stanford.edu
From: William Glen <bglen@usgs.gov>
Sent: Thursday, August 18, 2005 16:11:39 -0700
Subject: Saving Heliopolis

Dear Dr. Rasch:

My feelings, after reading of the history of Heliopolis, is one of amazement. It is a total enigma as to how a Stanford dean could continue to call for the destruction of this absolutely unique and historically significant artifact and landmark.

You don't have to be a historian of science (which I am) to join the effort to stop demolition. I hope that you can play a role in preventing what is tantamount to the burning of a chapter in the book of Stanford's history.

William Glen, PhD
Visiting historian of science
U.S. Geological Survey
345 Middlefield Road, MS901
Menlo Park, CA 94025

*Recorded by: B. Lash

*Date: 9/25/05

Continuation Update

In-depth historical information about the Bracewell Observatory at Heliopolis is provided in the following attachments:

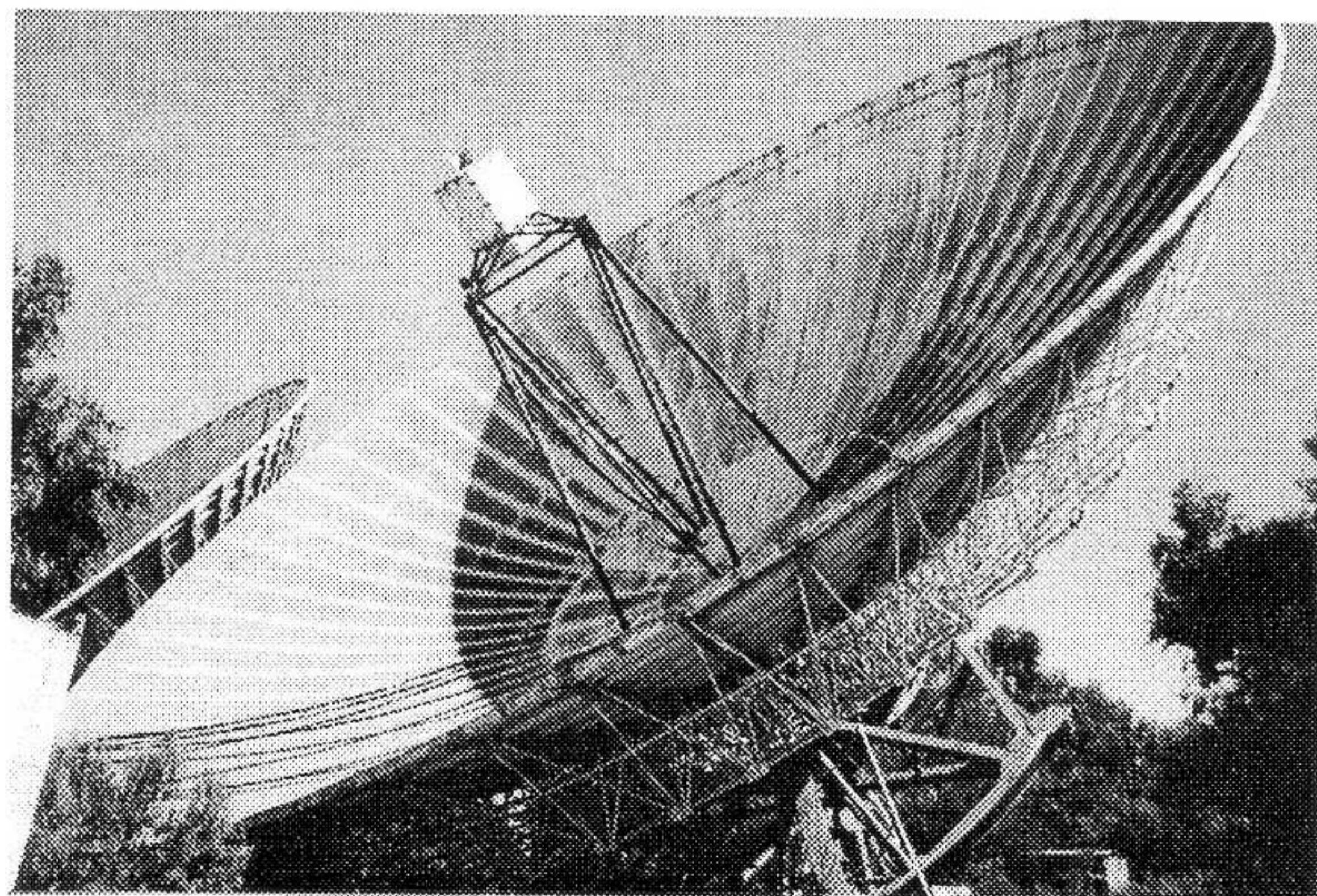
<u>Attachment</u>	<u>Description</u>
A	Biography of Ronald N. Bracewell
B	Photos and technical descriptions of the 32-dish and 5-dish arrays of Heliopolis
C	The Early Years of Radio Astronomy: Reflections Fifty Years After Jansky's Discovery
D	Radio Astronomy at Stanford from the Journal of Astronomical History and Heritage
E	Famous Visitors to Heliopolis and their Hammer and Chisel Signatures
F	The IAU / ICHA Newsletter, No 7., 4/05 on historically significant radio telescopes
G	Digital Picture Processing, Vol. 1., 1982 on origins of image reconstruction
H	Radiology, Vol. 117, No.3, 1975, "Image reconstruction... [was] solved by Bracewell"
I	Phys. Med. Biol., Vol. 21, 1976 "[CT imaging] ...method was first derived by Bracewell"
J	Stanford Daily, May 20 1992, "Bracewell... elected to the Institute of Medicine [for CT]"
K	Campus Report, May 20, 1992 "Bracewell Recognized by Institute of Medicine [for CT]"
L	Image Restoration and Reconstruction, 1986 "Originally put forward... by Bracewell"
M	1996 SEGUNA Award: "A universally acclaimed giant among all scientists."
N	Cancer Related Astronomy, 1994, remarks for the Heinrich Hertz Medal Award
O	Ronald N. Bracewell Awards and Citations
P	Certificate of Election to the Institute of Medicine, National Academy of Sciences, 1992
Q	Inspection Report Summary for Site 515 Antenna Array, Control Room, and Shelter
R	Observatory Reports of the Stanford Radio Astronomy Institute, 1961 – 1980
S	The Stanford Five Element Radio Telescope, Proc. IE 35775
T	Five Element X-Band Array Design Factors, GLINT No. 153, 1966
U	Inventory of Historical Document and Photo Cartons for Site 515 as of December, 2004
V	Petition to save the dishes, with comments from the public regarding historical significance
W	List of Publications by R.N. Bracewell

*Recorded by: B. Lash

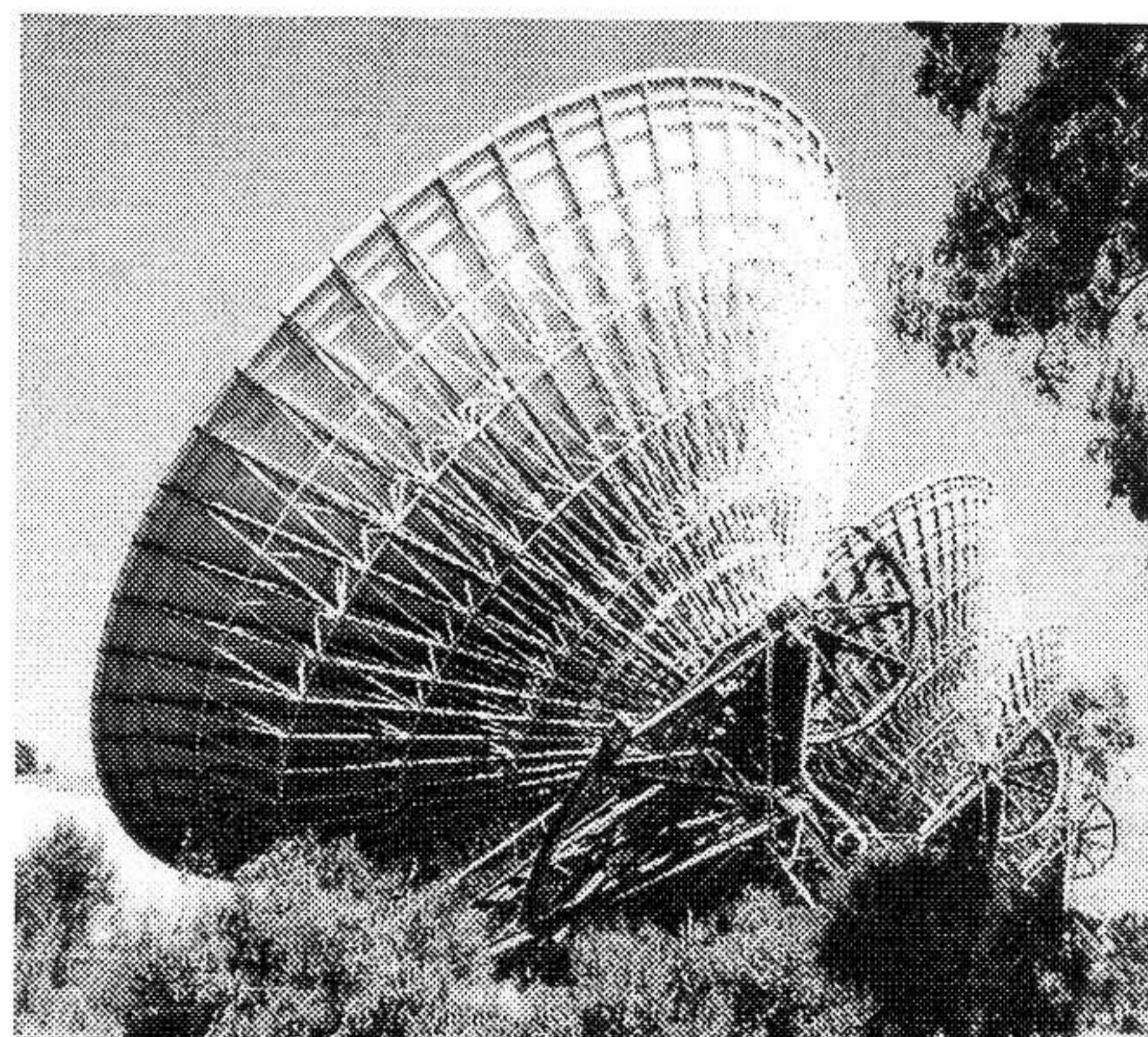
*Date: 9/25/05

Continuation Update

Current condition and integrity:



*View looking west 2005, dishes 4 & 5
(Septimo, Decimo)*

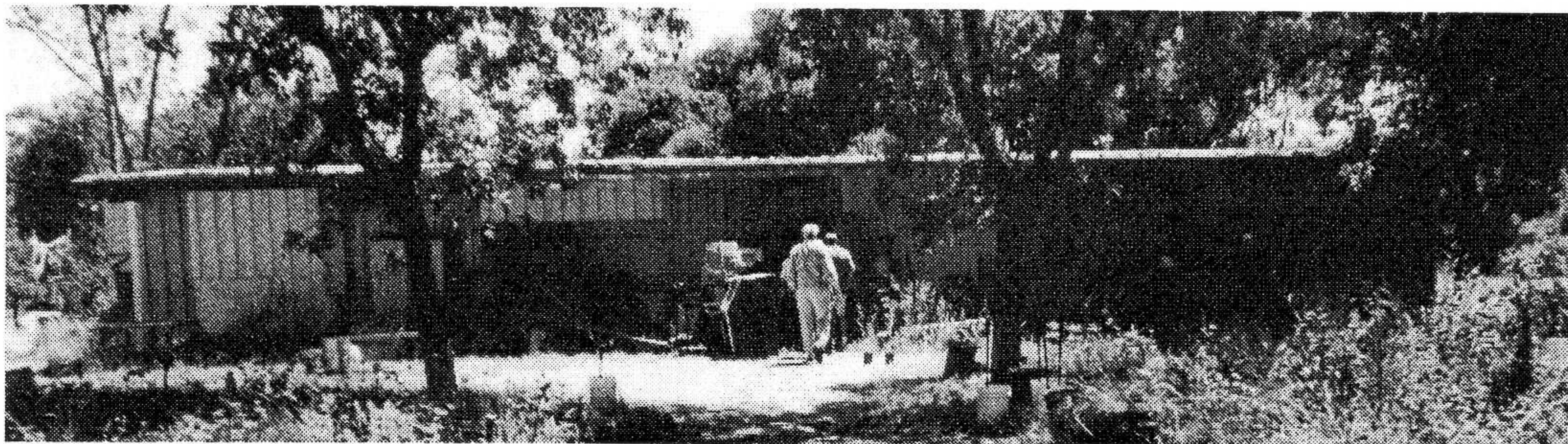


*View looking east 2005, dishes 1, 2, & 3
(Primo, Secundo, Tertio)*

Radio Telescope Dishes (Historic names: Primo, Secundo, Tertio, Septimo, Decimo)

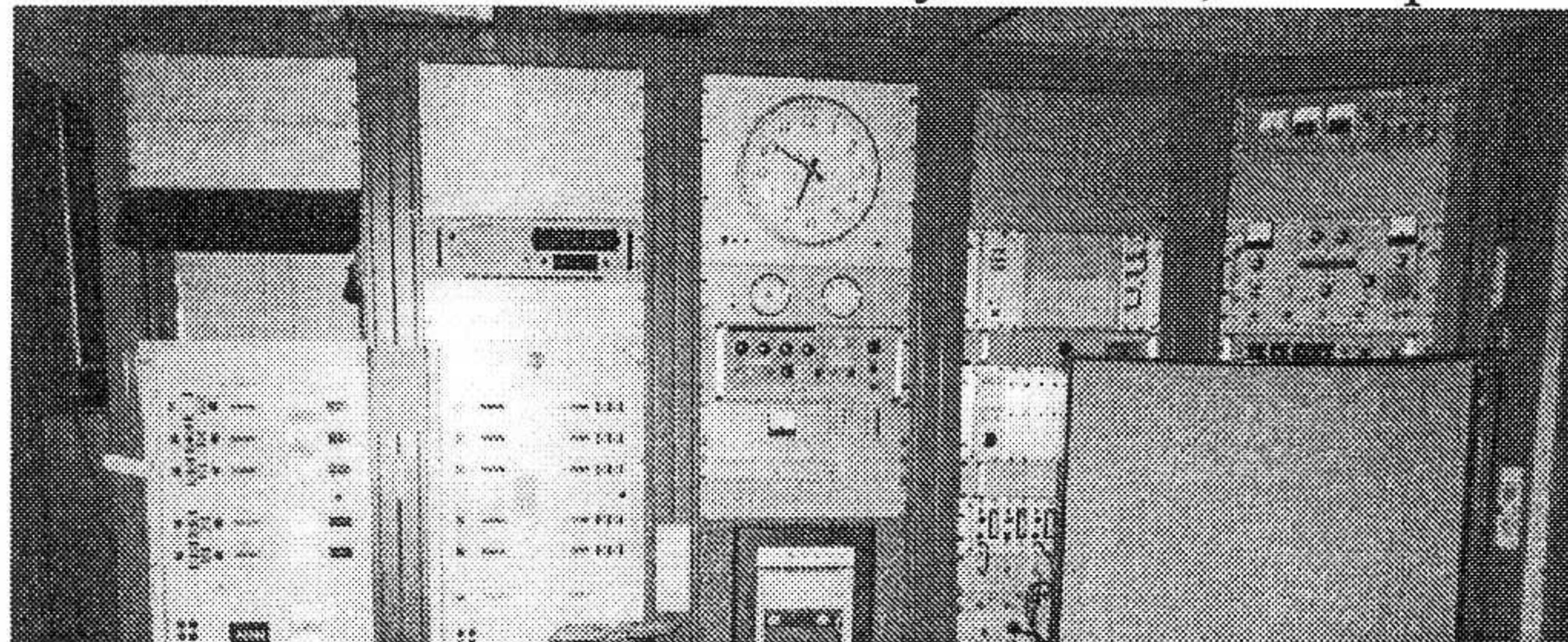
Dish panel surfaces are intact. Mounts are structurally sound, and all key parts are still there. Surface rust is superficial, and can be removed and re-painted. System electronics are intact. Surface grime easily washes away, revealing intact white enameled aluminum panel surfaces. Hour Angle (east-west movement) and Declination (north-south movement) drive components are intact.

Control Room (Butler building)

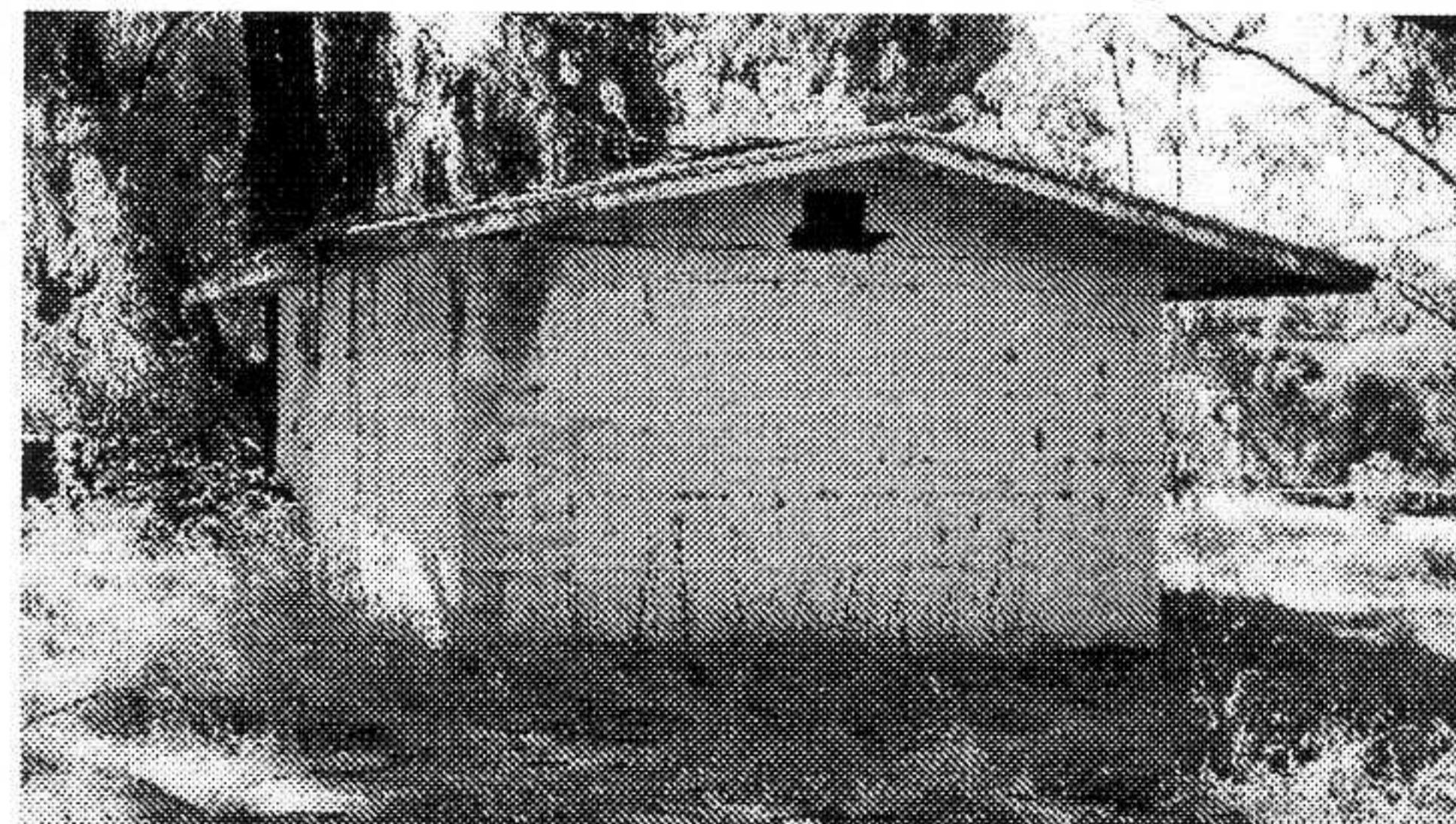


View looking south, 9/2004

The control room is a fully intact 1,500 square foot pre-fabricated Butler building, with metal roof.



*Interior of control room building.
Telescope systems are fully intact.*



*View looking west, 9/2004
Antenna Combiner Shed, 500 sq. ft
Fully intact. but roof needs repair.*

Last Fax

<u>Identification</u>	<u>Result</u>	<u>Pages</u>	<u>Type</u>	<u>Date</u>	<u>Time</u>	<u>Duration</u>	<u>Diagnostic</u>
14082994769	OK	18	Sent	Nov-08	09:06P	00:19:39	002585030022