

The O B S E R V E R

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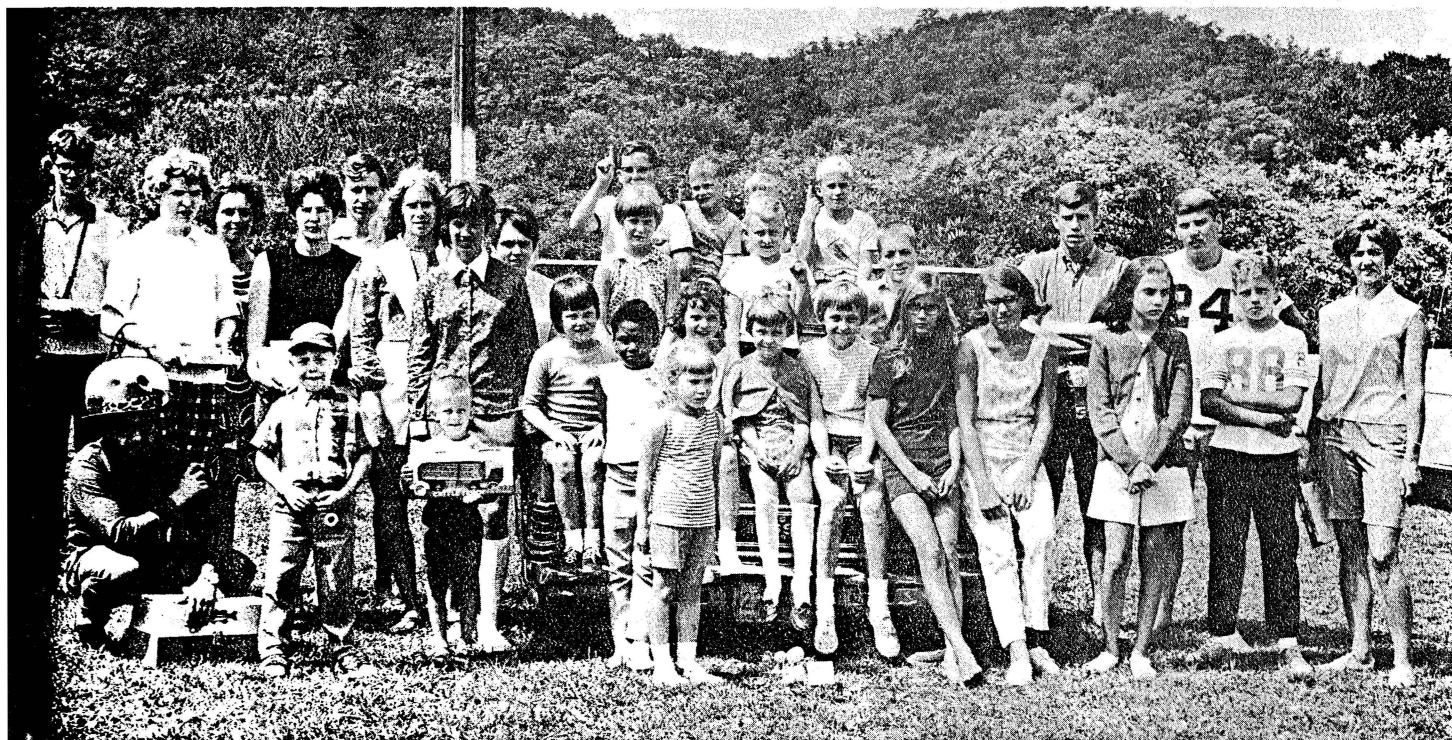
September 1969

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NRAORA PICNIC — AUGUST 9, 1969



Approximately 400 people passed through the food line!
(See page 2.)



Happy winners of games! (See page 4 for names.)

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THE OBSERVER REOBSERVED

This is the first issue of a new series of The Observer. Our intention is to make it an Observatory newspaper reporting the events and plans at our three sites: Green Bank, Charlottesville and Tucson. Information on new telescopes, Congressional hearings, new employees, births, athletic activities, and gripes are a sample of the subjects that are both proper and necessary to make The Observer an informative and, we hope, lively newspaper. Articles by our scientific staff as well as a column from the Director's office will be standard features. Information about our visitors and news from the various divisions will appear in each issue.

Appropriate and proper articles and letters to the editor are welcome. However, the success of this new Observer will depend on our regular contributions and reporters. Theirs the credit. Initially, The Observer will appear bimonthly. This is the only modesty we have in our plans.

COVER — THE NRAORA PICNIC

Despite the rain and wind storm, approximately 400 persons attended the picnic, and they were looking for action. And there was plenty of action for those seeking it. The games were lively and everybody seemed to enjoy participating in them. There was, however, an occasional hiccup from the P.A. Some thought the men-women wheelbarrow race was the highlight while others enjoyed the egg-throw more.

Some of the people responsible for the successful outing are Bill McLaughlin and cooks, food; Jon Spargo, Dave Williams, and Tom Carpenter, games; Bev Weatherholt, prizes; Carl Chestnut and Ken Anderson, P.A. system and Leroy Webb, straw boss.

A good time was had by all !

The Observer is a bimonthly publication of the National Radio Astronomy Observatory.

FROM THE DIRECTOR'S OFFICE

It is a pleasure to welcome the return of The Observer. The editors have developed a format which should produce an entertaining and informative newsletter, and I hope it can be a means of keeping everyone informed of NRAO plans and activities. As a start, I can report briefly on plans for the immediate future.

Congress has not yet approved a budget for the National Science Foundation for the fiscal year that began July 1. As soon as they do we expect to be able to start work on resurfacing the 300-ft telescope, and building a new control building for it. The new surface will cost about half a million dollars and will make the telescope much more efficient for use at 18 and 21 cm wavelengths. With the new surface the telescope would also be a powerful instrument for observations at wavelengths as short as 10 cm.

Plans for further development at Green Bank, hopefully in the near future, include expansion of the interferometer by the addition of another 85-ft telescope and perhaps several smaller telescopes, construction of a winter activities center, and construction of a new tourist center. More will be said about these plans in subsequent issues of The Observer.

Like most scientific organizations in the United States, the NRAO has had to mark time the last few years, as far as construction of major new instruments and facilities is concerned. This has been due to a general tightening of the federal research budget, and it may well continue for several more years. However, we have not marked time in other respects. In 1968, 153 different scientists and students from all over the world worked at NRAO, three times as many as did so just five years earlier. This notable increase in the number of people using the NRAO reflects not only the general expansion of interest in radio astronomy but also the increasing role of the NRAO as a mentor-oriented research center. More than two-thirds of all present radio astronomy graduate students in the United States, and more than two-thirds of all active post-Ph.D. radio astronomers who have received their degrees in the last five years have worked at NRAO in one capacity or another.

The strength of the NRAO derives from the excellence of its personnel, the quality of its equipment, and especially from its attitude towards visitors. Our equipment and services are made equally available to any scientist with an appropriate research program, regardless of where he comes from, whether we like him, and whether he is an easy or difficult person to work with. This attitude towards the visitor-user of our facilities is central to the concept of NRAO as a national observatory. The worldwide recognition of NRAO as a leading scientific institution and a good place to come to do research is a great tribute to the attitudes and efforts of everyone at Green Bank and Charlottesville.

One unfortunate, but almost inevitable, result of NRAO's success has been a lessening of contact and communication between people and groups within the Observatory. In the "good old days" a few years ago everyone knew everyone else, what he was doing, and what the plans and hopes of the Observatory were. With increased size and diversity of activity this has become more difficult to achieve, and the difficulty is further enhanced by having three physically separate sites—at Green Bank, Tucson, and Charlottesville. To fulfill its function and meet the growing demands of radio astronomy the NRAO must almost certainly grow still larger. One of our great challenges is to maintain communications and a close-knit cohesiveness in the face of further growth. The Observer can play an important role in this respect.

It is perhaps not readily apparent to everyone just what is the ultimate outcome and importance of his work at the Observatory. The "product" of the NRAO is published research, and in 1968 for example, work at NRAO resulted in publication of 75 papers by 84 authors, in 21 different journals and books. This was a significant fraction, in both quality and quantity, of the total radio astronomy research around the world. Few of us see all or even any of these publications, but everyone at NRAO contributed to them, and I hope that everyone is aware of, and proud of, what he has contributed to. Radio astronomy

Continued --

today is one of the most vital and exciting fields of science. The importance of radio astronomy and of science in general is somewhat nebulous and difficult to define, but it surely has a profound and beneficial influence on our civilization. I hope that everyone at NRAO can somehow share my excitement and pride at being associated with radio astronomy and with the NRAO.

D. S. Heeschen

RECRUITMENT FOR
GREEN BANK PHYSICIAN

Many physicians have been contacted regarding the medical practice and excellent facilities that are available to a doctor wishing to locate in Green Bank. A number of offers are currently outstanding. It is hoped that a more encouraging and positive announcement can be made in the near future.

—Editors

Game winners (from page 1):

First row, l. to r. — Skip Thacker, Carl Behrens, David Liptak, and Cindy Shank.

Second row, l. to r. — Jane Carpenter, Emily Chestnut, Lisa Heeschen, Rosalind Davies, Amy Vrable, Beverly Tyson, Susan Vance, Amber Ralston, Debbie Ralston, Teddi Riffe, Pam Simmons, Betty Gum, Rusty Taylor, and Bev Weatherholt.

Third row, l. to r. — Warwick Davies, Mrs. Rod Davies, Richard Manchester, Renalda Mays, Terry Lutton, Mark Carpenter, Shelly Cassell, Gary Cassell, Steve Hamed, and Doug Morrison.

Fourth row, l. to r. — Philip Horne, Brian Waslo, Scotty Howell (hidden) and Mark Waslo.

Not shown: Wendy Carpenter, Ron Henderson, John Jenkins, Mike Shank, Patrick Smith, and John Sutton.

NRAO TOUR PROGRAM

The tours began June 14 and ended August 24. The program consisted of (1) a 15-minute color movie and (2) a 40-minute bus tour of the site. We were fortunate to have two new GMC buses for the five tours each day, Wednesday through Sunday.

A record of the visitors was kept according to number and state. Booklets, postcards, and popular books on both optical and radio astronomy were sold.

Highest registration — July 23 — 417 persons, and lowest registration — June 12 — 72 persons. Most of the visitors were from W. Va or neighboring states. However, nine foreign countries were represented — Australia, Canada, England, France, Holland, India, Japan, Puerto Rico and Scotland.

There was a slight decrease in the number of tourists — 11,000 (est.) in 1969 as compared with 11,500 in 1968.

The tour program is headed by Wally Oref. He was assisted by Mr. June Riley. Nancy Waybright was tour receptionist. Harlan (Pistol) Tallman and Johnny Nelson were bus drivers. Three summer students, Mike Allen, Ken Cashdollar and Dave Ceperley, were tour guides.

In addition to the tour program, the Public Education department also answers letters and requests for information and photos from individuals, newspapers, and publishers. While the following letter is not typical, Wally answers all inquiries directed to him.

"Dear Sirs:

Would you please ask the head astronomer (or equivalent) what the chances are of Haily's comet colliding with in 1986. What is the size.

This may be just a roomer, but, my friend told me that he read it somewhere. I would be most grateful if you would send the reply to me.

Very truly yours,

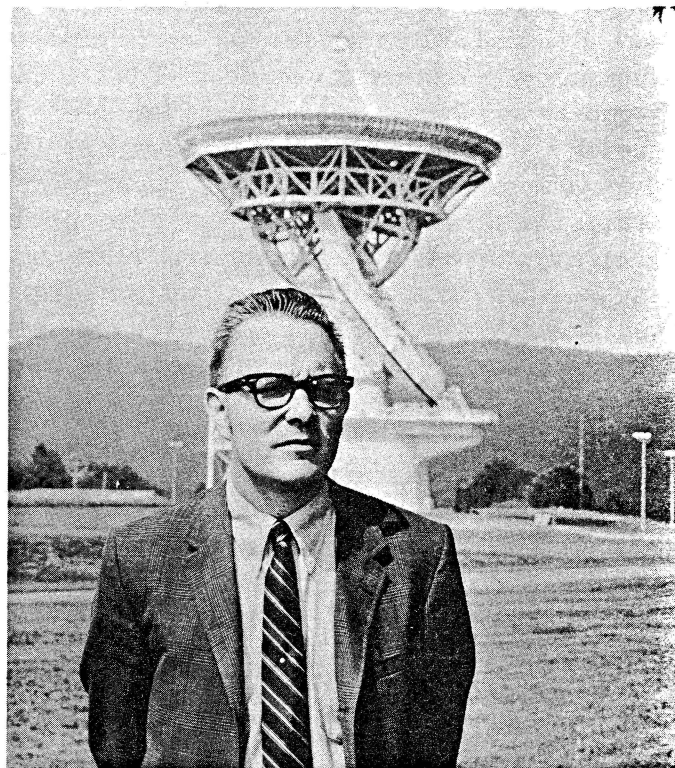
..... "

SOME FACTS ABOUT FORMALDEHYDE
AND OTHER MILKY WAY MOLECULES

L. E. Snyder[‡]

Formaldehyde has been of such current interest around the Observatory for the past few months that people are tired of hearing about it. So when I was drafted into writing this article for the first edition of the resurrected Observer, it was decided to present something different — obscure facts. Hopefully, some of the facts revealed in this article will be stored in memory and reproduced for the entertainment of all at the next party or trivia game. For example, instead of asking, "What was the name of the horse owned by the Lone Ranger's nephew?" one could ask, "From what species of red ant did the formaldehyde molecule obtain its name?" You may recall that Victor was the name of the horse, but if you want to learn how formaldehyde was named, you'll have to keep reading.

There are approximately one million different molecules known to exist on earth and the carbon compounds alone have been estimated at about 100,000. In contrast, the number of molecules detected in the interstellar medium is infinitesimal. In addition, the rate of detection of interstellar molecules has been very slow when we consider that the first interstellar molecules (CH, CH⁺, and CN) were found by optical astronomers in the late 1930's and early 1940's. In 1963 interstellar OH was detected at 1665 and 1667 MHz by S. Weinreb, A. H. Barrett, M. L. Meeks, and J. C. Henry. For the next five years, the only known interstellar molecules were the diatomics (composed of only two atoms) CH, CH⁺, CN, and OH; of these, OH was the only molecule detected in the radio frequency region. This bleak situation started changing rapidly in late 1968 when the Berkeley team of A. C. Cheung, D. M. Rank, C. H. Townes, D. D. Thornton, and W. J. Welch reported detection of interstellar ammonia (NH₃) near the galactic center. In early 1969 the same team reported the detection of intense signals from interstellar water (H₂O). The existence of interstellar water (sometimes called "the rain in space") was not totally unexpected but the signal intensity was surprisingly high and very suggestive



of a maser action similar to that in OH.

While the water and ammonia investigations were continuing, a third interstellar polyatomic (composed of more than two atoms) molecule was discovered using the 140-foot telescope. The detection of signals from interstellar formaldehyde (H₂C¹²O¹⁶) was reported by the team of D. Buhl, B. Zuckerman, P. Palmer and myself late in March, 1969. Formaldehyde is the first organic polyatomic molecule ever found in interstellar space. In contrast to the ammonia and water vapor, it was detected in many different regions of our galaxy, leading to speculation that formaldehyde may be a general feature of the spiral arms of the Milky Way. In June 1969 we detected signals from galactic center clouds of H₂C¹³O¹⁶, a second form of formaldehyde which seems to be less abundant than ordinary formaldehyde (H₂C¹²O¹⁶) due to the rarity of heavy carbon. (The terrestrial value of the C¹²/C¹³ ratio is about 90.)

Continued --

[‡] Dr. Snyder left the Observatory August 29 and he has joined the staff of the University of Virginia.

So in just a few months, the interstellar medium has yielded four new molecules in the radio frequency spectrum and all are polyatomic. As a result, many people wonder why some of these weren't found earlier by radio astronomers. Part of the answer is that many spectral lines which were beyond detection several years ago may be found quite easily today because equipment has improved tremendously over the past few years (mainly due to the efforts of engineers and technicians at the National Radio Astronomy Observatory and elsewhere). Another reason is that many astronomers were convinced that interstellar polyatomic molecules could never be found because ultraviolet radiation would destroy them before they could be generated in sufficient numbers for detection. As a result, six years elapsed between the initial OH detection and the ammonia discovery. Today we are in a renaissance period for interstellar spectral lines and it is now generally recognized that dusty, protected regions exist in our galaxy where polyatomic molecules may be generated in abundant numbers.

It is quite probable that more exotic interstellar molecules will be found in the future and formaldehyde will be remembered only by veteran 140-ft operators reflecting back on early times. Before this happens, we should all learn the origin of the name "formaldehyde" and some of its common uses if we expect to win the next trivia game. It all starts when methanol (wood alcohol) vapors passed over a heated copper or silver catalyst (in the presence of air) lose hydrogen atoms and yield formaldehyde. Thus "dehydrogenated alcohol", or al-dehyde, explains the last part of the name. Formic acid is generated by the oxidation of formaldehyde which explains the first part of the name. To complete the picture, formic acid got its name because it's found in the body of the common red ant *formica rufa*. This may explain why a lady from England recently wrote urging a search for interstellar ants in formaldehyde clouds. Anyway, back on earth formaldehyde is a gas at ordinary temperatures but it is commercially available in a water solution called Formalin (in Europe it's called Formol). Formalin was once used as an antiseptic but now is often used in embalming fluids instead. A primary industrial use of formaldehyde is in the production

of phenolic resins including Bakelite. Formaldehyde combines with ammonia to produce hexamethylene tetramine, which yields a powerful explosive upon nitration. In fact, it has been estimated that half of all formaldehyde produced during World War II was used to manufacture explosives. So much for some of the uses of earthly formaldehyde.

Unfortunately, we don't have as much information on the role of formaldehyde and the other molecules in the interstellar medium. We do know that formaldehyde is closely related to methane (CH_4) and its alternate name is methanal—which comes from a chemical naming system of comparing aldehydes with the hydrocarbons (methane in this case) containing the same number and arrangement of carbon atoms. We also know from radio telescope observations that some of the clouds near the center of our galaxy (Milky Way) contain OH, ammonia, water vapor and formaldehyde and future observations may show all four molecules to be mixed in the same cloud. Some of the clouds probably contain methane as well. Scientific speculation becomes risky beyond this point and mainly concerns interstellar chemical reactions. For example, amino acids have been generated with electric discharges through mixtures of hydrogen, ammonia, water and methane in laboratory experiments. Amino acids are important basic building blocks in life chemistry (for example, biochemists have found that all proteins are derived from only twenty amino acids). It may be that amino acids and more complex molecules are generated by astrochemical reactions in some interstellar gas clouds. This complex molecular mixture has been called "life soup" and the cloud containing it could be labeled a "biocloud". It's interesting to speculate further that after a star is formed an ejected planet may orbit through a biocloud and sweep up the seed molecules needed for the start of life processes. Thus it's not difficult to imagine that when we observe water, ammonia, and formaldehyde on the radio telescope we could be looking at fragments of the building blocks of future life in our galaxy.

L. E. Snyder

OLD FRIENDS - NEW FACES

Frances Copper

Professor Fred Hoyle, Plumian Professor of Astronomy and Experimental Philosophy at the University of Cambridge, and Director of the Institute of Theoretical Astronomy in Cambridge, will be visiting us in September.

Professor Hoyle will give the Fourth Annual Karl G. Jansky Lecture, "The Relationship of Astronomy and Physics," September 24, in Charlottesville.

Dr. John Shakeshaft of the Mullard Radio Astronomy Observatory will also be coming to Charlottesville in September, to give a colloquium on "Recent Work at the Mullard Radio Astronomy Observatory" on September 2.

Another colloquium speaker, Dr. James A. Roberts, will be coming from the University of Toronto to talk on "Interstellar Scintillations" on September 25.

Among the visitors coming to NRAO after the URSI meeting in Ottawa will be:

Dr. E. J. Blum, Observatoire de Meudon

Dr. A. Tlamicha, Observator Ondrejov

Dr. J. W. M. Baars, Dwingeloo

Mr. J. V. Nieukoop, Observatory of Utrecht

Prof. Olof Rydbeck Chalmers University

Dr. Bertil Høglund of Technology,

Mr. Bert Hansson) Sweden.

Also in September, Dr. R. S. Jin, Florida Institute of Technology, is planning to visit NRAO. His tentative arrival date is September 8.

In October, Dr. Bart J. Bok, AUI Trustee from the University of Arizona, plans to spend thirty days at NRAO in Green Bank and Charlottesville.

Also in October, Dr. L. Matveyenko (P. N. Lebedev Physical Institute), Dr. M. Cohen (Cal Tech) and Dr. D. Jauncey (Cornell) will be at Green Bank to participate in a VLB experiment between Crimea and Green Bank.

Continued, next column --

Visitors who will be using the Green Bank telescopes in September and October include:

From MIT:
 Dr. A. H. Barrett
 Dr. B. Burke
 Dr. M. Ewing
 Mr. H. Hinteregger
 Mr. C. Knight
 Dr. A. E. Rogers
 Dr. I. Shapiro
 Dr. D. Staelin
 Mr. A. Whitney
 Mr. W. Wilson
 Dr. S. H. Zisk

From the University of Maryland:
 Dr. G. Westerhout
 Dr. B. Zuckerman

From the University of Toronto:
 Dr. E. R. Seaquist
 Mr. H. N. Ross

From the University of Chicago:
 Dr. P. Palmer

From the State Univ. of N. Y. at Albany:
 Dr. M. Kaftan-Kassim

From Rice University:
 Dr. G. K. Walters

From Queens University:
 Dr. A. H. Bridle

From NASA, Goddard Space Flight Center:
 Dr. T. Clark

From Harvard College Observatory:
 Dr. J. Ball

From Stockholms Observatorium:
 Dr. P. O. Lindblad

The following will be using the 36-ft telescope in Tucson during September and October:

From Goddard Space Flight Center:
 Dr. R. Hobbs

From the University of Arizona:
 Dr. F. J. Low

From the University of Maryland:
 Dr. M. R. Kundu

From Mt. Wilson and Palomar Observatories:
 Professor H. Zirion

From the California Institute of Technology:
 Dr. M. Simon

From Observator Ondrejov (Czechoslovakia):
 Dr. A. Tlamicha

TERMINATIONS

Wilhelm J. Altenhoff, Basic Research, to the Max-Planck-Institut fur Radioastronomie, Bonn, Germany.

John P. Basart, Basic Research, to the E. E. Department, Iowa State University, Ames.

Russel A. Summers, Central Shops, to the Brown Electrical Company, Charleston, W. Va.

Lewis E. Snyder, Basic Research, to the University of Virginia, Charlottesville.

Merritt M. Gum, Plant Maintenance, re-tired on July 4, 1969.

JESSE DAVIS SAYS GOOD-BYE TO NRAO

I arrived here in January of 1966 as a co-operative education student from VPI. I have since been a wreaking havoc in the Electronics Interferometer Group (the good group).

This summer marks the end of my stay, with things returning to normal. From here I return to school to finish the requirements for my B.S. in physics.

I found the co-op program to be very beneficial and I enjoyed my stay in Green Bank.

J. D.

BEST WISHES, JESSE!

MIKE BYORICK MARRIES

Mike Byorick, former co-op student in the Electronics Division, was married to Delores Jean Fain on August 9 at Saint Anne's Episcopal Church in Atlanta, Georgia.

Congratulations may be sent to them at the following address: 1122 State Street, N. W., Apartment 3, Atlanta, Georgia 30318.

SKIP THACKER SAYS
"SO LONG; SEE YOU LATER!"

After working at Green Bank for two years I'll finally be getting on to graduate school this fall. My wife, our little boy, and myself will be leaving Green Bank to go to Boston September 10th. Hopefully, we will be gone for only a year; then return to all of the friends we have in Green Bank.

It will be hard to get used to the academic pace after working in Green Bank for so long. The hardest part, I imagine, will be to resist temptation to participate in too many of Boston's extra-curricular activities. We will be living in an apartment not too far from campus. Our address will be 41 Roberts Road Cambridge, Massachusetts 02138.

GOOK LUCK, SKIP!



Congratulations to Jim Finks, recently promoted to Business Manager. We wish you continued success!

EXPLORING THE MOON

J. W. Findlay[‡]

Apollo 11 landed on the moon on the afternoon of Sunday, July 20th; two astronauts made man's first direct study of the moon's surface on July 21st; and all three astronauts, with the boxes of samples of lunar material, landed safely in the Pacific Ocean on July 24th. Thus the first attempt by man to visit another solar-system body was a magnificent success.

The story of the landing goes back to the earliest science-fiction writers; our aspiration to leave our planet and visit others has existed for hundreds of years. Before President Kennedy set the goal of a safe landing and return by 1970, a lot of thought had been given to the techniques of taking man to and from the moon. The way it was finally done, by establishing what was essentially a small manned orbiting lunar base from which the LM would go to the surface, was decided on soon after the President's speech. This choice itself was made after a most serious and difficult discussion of the right way to go, the alternative being to work from a manned Earth-orbiting base.

The history of Apollo begins with the first sub-orbital shots (the second Mercury shot in January 1959 carried a now-forgotten space hero, (Ham the chimpanzee); it includes Alan Shepherd's 15 minutes of sub-orbital flight (May 1969), John Glenn's three orbits in February 1962, the whole of the Gemini program, and the first orbits by man around the moon at Christmas 1968.

Science has been a part of Apollo from the start, and it is with the scientific purposes of moon landings that I have been chiefly concerned during the last two years. For this first landing, the amount of science to be done had to be severely restricted to make sure that there were duly adequate margins for safety throughout the flight plan. I went to Houston for a meeting of

the Science and Technology Advisory Committee, which has, for many years, helped Dr. George Mueller, the Associate Administrator for Manned Space Flight, with planning manned operations. We chose to meet on Saturday and Sunday, July 19 and 20, so that, if all went well, we would be at the Manned Spacecraft Center for the vital stages of the mission.

The experiences of the flight are over now, but the most dramatic moments to me were the 12 minutes during which the LM left its low orbit and flew to a safe landing in Tranquillity. The search for the safest and smoothest landing site had occupied the unmanned Lunar Orbiter and Surveyor spacecraft for years. Only a smooth uncratered area in a narrow belt around the moon's equator could be considered. Many scientists and engineers studied and argued before Site 2 (of the six prime sites) was finally chosen for the first attempt. Many factors had to be right: the sun-angle had to be low with the sun behind the LM; there had to be a good radar path to the site so that the landing radar would work well; and the site must allow for a delay in the Saturn V lift-off — these and many other factors were weighed.

We listened to the landing in our own conference room at Houston, on the end wall of which were projected various displays from Mission Control. We heard all the flight director's and astronauts' communications, and on one side we had Walter Cronkite's commercial program. Sitting with us were several of the senior NASA and Bellcomm* scientists and engineers who had worked with Apollo from its early days. We chose this location rather than the viewing rooms of Mission Control so that we could discuss and question what we saw as it happened. No talking was allowed in Mission Control.

The two most remarkable things about the actual landing phase were the overall precision of the landing profile and the general air of quiet competence shown by the Mission Control staff

Continued --

[‡] Member of NASA's Lunar and Planetary Missions Board.

* Bellcomm is a subsidiary of Bell Telephone and works closely with NASA on planning manned space flights.

and the astronauts. Mission Control had to call for three "go-abort" checks during the descent. From the flight director's first comment — "We will play this real cool." — to the landing, there was no sign of excitement or stress in the voices reporting the flight status. Equally, as we saw the computer plot the trajectory achieved every 15 seconds on top of the planned lines, the accuracy was remarkable. The last 30 seconds, with an astronaut calling velocities and height as the LM made its final few hundred feet of descent, were equally calm and equally accurate. When we heard that the landing was safe there were many voices in our room much more unsteady with emotion than were those of the astronauts and controllers. I shall long remember the scene as the scientists from outside NASA congratulated those who worked so long for the success achieved in those few minutes of time.

The extra-vehicular activity (or moon-walk) was less dramatic but much more interesting scientifically. After the first few steps we were delighted to see the astronauts' ease of movement. For later moon landings a better space suit is being developed; with this the astronauts should be very mobile. The first results of the surface survey were most surprising. We no longer expected several feet of "gold dust", but why the very compact subsurface? Aldrin, the astronaut who drove in the tube to get the core sample, said that he bent the top of the drive tube by hammering. Such compact, highly resistive material was not expected. We were delighted with the amount of science achieved — the seismometer and the rock samples were tremendous steps in geophysics and geology.

Houston was quiet as we left on July 21st. The mission was not complete, although the highest risks were over. Even after splash down, Houston and NASA will not have much time to relax. The future of our space program is still undecided; hard questions as to the amount we spend on space will have to be answered. I believe that, with the intelligence and effort which we can apply to large issues, we can, with care, plot the right course for our future in space and also do our part to improve the condition of mankind on earth.

RESIDENCE HALL REDECORATED

Wally Oref

Visitors who haven't stayed in the residence hall for a couple of years will likely be surprised by the changes. Pleasantly surprised we hope. Last year a major improvement was made in rooms and apartments by adding individually controlled air-conditioning units. This year painting, wall-to-wall carpeting, new drapes, and some new furniture have given the rooms and apartments a first-class look.

The addition of air conditioning in each unit (16 rooms and 4 apartments) has considerably helped to reduce several long-time complaints. The most general complaints were that previously the units were too hot in the summer and during the winter the temperatures were almost impossible to control (they sort of blew hot and cold). Once the bugs were worked out of the heating and cooling system, these complaints have almost vanished.

This year all the rooms and apartments were painted. Before this year all units were one color. This year we used three different color schemes. All the ceilings are Oyster White, and the walls are either Provincial Gold, Warbler Green, or a greenish-white of our own creation. After the painting was finished, wall-to-wall carpeting was laid in each unit. The color of the carpeting is Olive Green. Following the painting, new draw drapes were hung. The drapes are white with heavy lining. Rooms can now be darkened for day-time sleeping. Lastly, worn and uncomfortable furniture was replaced.

We now feel that the units in the residence hall are comfortable and pleasant. The summer and winter temperature problems have been almost eliminated. The soft room colors are cheery. The new drapes permit day-time sleeping for those who work nights and the wall-to-wall carpeting has reduced the noise level between rooms.

Our next goal: color TV, coffee units in each room and coin-operated massages. Other suggestions have been made to improve the residence hall. You can probably guess what one of them was.



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GOVERNOR

PROF. CHARLES N. COCHRAN
DIRECTOR

NATIONAL YOUTH SCIENCE CAMP

The following article has an indirect bearing on the NRAO. Many of our employees have participated in the National Youth Science Camp program and have found their lecture/discussions with these science students inspiring. In addition to their high intelligence and never-ending curiosity, the Campers have a keen interest in mankind's future. Author Kessell informs us that "Neil Armstrong did indeed receive a special tour of the Observatory during his Science Camp visit in 1964; Chuck (Cochran) tells me that he was very interested in the research being conducted there." It's too bad we didn't preserve those famous footprints! — Ed.

*Special for The Observer, c/o National Radio Astronomy Observatory, Green Bank, West Virginia
Story by Stephen R Kessell, Director of Public Relations.*

REACH FOR TOMORROW — The National Youth Science Camp Story

Each summer, the little West Virginia mountain town of Bartow becomes "home" for the nation's top one hundred science students — the delegates to the National Youth Science Camp. Each state is granted the privilege of sending two representatives; the boys are nominated by their Department of Education after careful and intensive screening of their academic record, and are then formally appointed by their own Governor. Their entire expenses for the three week honors program are covered by the State of West Virginia.

Founded during the West Virginia Centennial in 1963, the National Youth Science Camp is a remarkable departure from traditional education and camp programs. Placed in the informal and rustic setting of the Camp, the boys thrive upon the wide variety of activities and interests represented. Under the Direction of Professor Chuck Cochran, visiting scientists and specialists from across the nation and a resident staff of exceptional talent and wide interests provide the incentive and guidance necessary to make their stay at Camp the most memorable three weeks in these young men's lives.

On June 20, 1969, these hundred young scientists from 50 states arrived at the Kanawha Airport in Charleston, where they were met by the Science Camp staff, Miss West Virginia contestants and Congressman Ken Hechler. They were taken to Morris Harvey College by limousine, and later toured scientific industries in Charleston, were greeted by Governor Arch Moore, Jr. and then flew to Camp. June 22 marked the formal Opening Ceremony, where the boys were greeted by a host of dignitaries; they presented their state flags as they were introduced during the colorful ceremony. Later that day, Dr. P. C. Hammer, Chairman of the Computer Science Department at Penn. State University, addressed the boys on: *Problems in Mathematical Thinking*.

Thus the young scientists began their three weeks of living with some of the nation's most distinguished scientists, working and playing with men whose varied talents and interests covered an entire spectrum of activities and entering a brotherhood of a hundred new friendships which will indeed last a lifetime. A key to the success of the Science Camp is its avoidance of narrow specialization; as Camper Bob Breidenthal, Jr., of Wichita, Kansas, put it: *When you start reading about one subject, it's like driving down a narrow alley.*

---MORE---

Pretty soon there's no room to turn around. The only problem the boys faced was what to do during the limited time at Camp. After DuPont's Dr. Ronald Halliwell spoke on *High Polymer Chemistry*, many of the boys chose to pursue the discussion to great length. Others had their choice of taking a field trip led by Counsellor Larry Morse, an expert in botanical classification from Michigan State, visiting an Indian Burial Mound with Dr. Stacy Groscup and Counsellor Craig Solomonson, picking up some programming pointers for the Camp's IBM 1130 system and Wang Calculators, grinding a telescope mirror under the supervision of Counsellor Dave Van Pelt, discussing planetary radio research with Dr. Dave Buhl of the N R A O, improving their darkroom printing technique with Counsellor Mike Maxson, tying some trout flies under Steve Kessell's guidance in the Camp Craft Shop, entering in an inter-cabin volleyball game or merely writing a letter home. Special trips were arranged to points of interest in the area, such as the Camp Allegheny battlefield, Spruce Knob, Seneca Rocks and many more. Each weekend, overnight hikes in the Monongahelia National Forest were open to all the boys. The entire program of the Science Camp is voluntary; thus the boys gain a new responsibility in choosing the program best suited to their interests.

Of special interest to the boys was the visit to the National Radio Astronomy Observatory, at nearby Green Bank. Here the resident astronomers and engineers explained the areas of current research, so vital in man's quest for knowledge. Many of the young men expressed an interest in returning to the Observatory as summer research assistants. Several astronomers from Charlottesville center visited Camp to discuss their areas of interest.

A highlight of the Camp was the trip to Washington, where the boys were guests of the United States Senate. After tours of the Goddard Space Flight Center and the Naval Research Center, Mrs. Julie Nixon Eisenhower met the boys at the White House, followed by Congressman Ken Hechler's tour of the Capitol. Then came the Annual Senate Luncheon, where Senators from 33 states met and dined with their states' young scientists. Guest speakers in Washington included U S Commissioner of Education Dr. James Allen, Jr. the President's Science Advisor, Dr. Lee DuBridge, and Senator Ted Kennedy. Upon returning to Camp, the boys found a telegram of congratulations waiting for them from Apollo 11 Commander Neil Armstrong, a visitor to an earlier Science Camp program. The message read: *On behalf of Apollo 11, please accept our sincere congratulations to all of you for your selection and attendance at the National Youth Science Camp. Your outstanding abilities are receiving an important boost from this important program. We know that the next several decades will challenge the best you can offer and know you will enjoy participating in the solution of tomorrow's problems. We wish we had your future.*

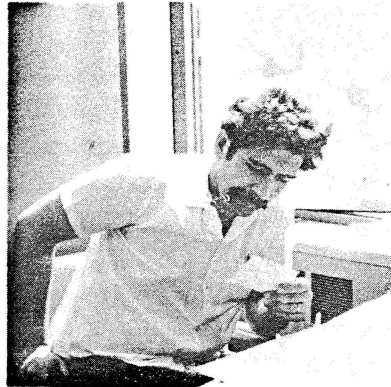
If man can go to the moon and beyond — if he is to cure the great social problems that face him today — to be free of pollution, disease, hunger and atomic annihilation — then this tremendous energy and potential displayed at the National Youth Science Camp, which is found in very few men and women, must be recognized and encouraged. To these hundred young scientists, the National Youth Science Camp is a very important yardstick in measuring their hopes and dreams in man's determined Reach for Tomorrow.

---END---

NEW EMPLOYEES



William F. Beyers, Jr.
Computer Division



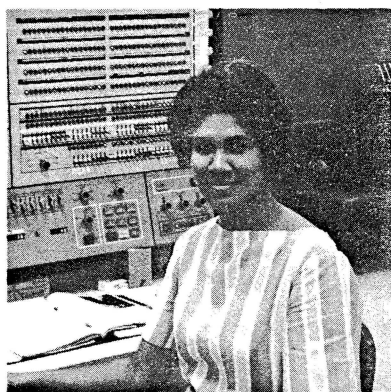
John Broderick
Basic Research



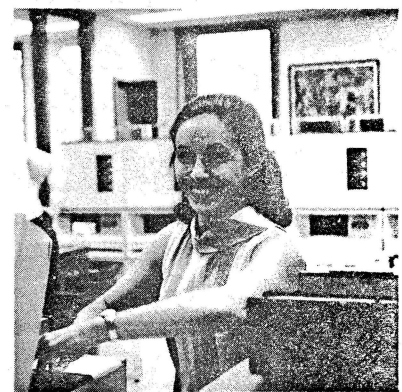
Jo Anne Byram
Operator/Receptionist



Betsey P. Chen
Computer Division



Ann S. Jackson
Computer Division



Elaine F. Litman
Computer Division



Richard N. Manchester
Basic Research



Gabriele Wilsdorf
Scientific Services



Cary A. Young
Electronics



George T. Wren
Computer Division



l. to r.: Archie Hughes, Electronics; Don Morris, Electronics;
Ronald Gordon, Control Shop

INTERFEROMETER

"So You Want to Move a Telescope! "

Jon Spargo

Imagine picking up an object weighing 15,510 tons and physically moving it 30.48 miles. This feat has already been accomplished by the experienced crews responsible for moving 85-2 and 85-3 along the interferometer baseline. Of course, this all wasn't accomplished at once but rather in 47 separate moves over the past year. The total comes from the fact that each telescope weighs approximately 330 tons and can be moved to any of 7 stations along the lower part of the 2700 meter baseline.

A typical move goes something like this. On the day of the move things start happening about 8 o'clock. Observing ends and the telescopes are stowed (pointing straight up). Then telescope operators, electronic technicians, telescope mechanics, electricians, heavy equipment operators, and civil engineers descend on the telescope and begin preparations for the move. Cables are disconnected, steps stowed out of the way, and the telescope is unbolted from each of its three pads. A guiding string is strung to the next station the telescope will rest on. Each leg of the telescope will be supported during the move by a huge multi-wheeled dolly which also carries a hydraulic jack used for raising or lowering the telescope at each pad. The two bulldozers that will supply the locomotive force to move the scope are hitched to two of the supporting dollies. At a signal, each hydraulic jack on each dolly is started and the scope is slowly lifted from its pads. After being pulled clear of the pads and lowered again, to reduce the center of gravity as much as possible, the final power cable is disconnected and off we go at the break neck speed of about a half a mile an hour.

During the move the telescope is kept aligned for the next pad by two plumb bobs, one on either side of the scope. These plumb bobs are kept directly over the guiding string, mentioned earlier, by the speeding up or slowing down of either of the bulldozers. Upon reaching the next station the scope is stopped short of the pads and raised so that it can be moved over them. If the final resting

point is several stations away, the scope will be lowered again on the other side of the pads and will continue on in this leaping manner until the desired station is reached. Once over the desired station all three legs of the scope are carefully checked for alignment over their respective pads and if all is well the scope is slowly lowered onto the pads by the hydraulic jacks. If the legs are out of alignment, a small amount of jockeying by one of the bulldozers will straighten things out in short order. Due to the proficiency of the crews, however, this is seldom required.

Once resting on its new station the scope is hooked up again. Before it can be securely bolted down, however, the civil engineers must perform a set of exacting measurements to assure that this scope is properly aligned. Usually some small alignment adjustments have to be made, and are accomplished by turning adjusting bolts on each leg of the scope. Once aligned and securely bolted, the telescope operators and electronic technicians proceed with a final checkout of the scope. After that the scope is ready for use.

To be sure, all this has developed into something of a routine for the crews involved. Consider, however, that an average move can be completed in 3 to 4 hours, and that on some days double moves involving both telescopes take place. Add to that the fact that these moves take place the year around in all kinds of weather. Throw in also that through all this a perfect safety record has been maintained. Add all these to the figures presented earlier in this article and I think you'll agree that it all adds up to an enormous job well done indeed.

So you want to move a telescope? Just ask the interferometer crews; they'll show you how.

Daughter: "I took Henry into the loving room last night, and . . ."

Mother: "That's LIVING dear."

Daughter: "You're telling me!"

CENTRAL MACHINE SHOPS

W. Cottrell and M. Wimer

Lake Sipe has been busy for sometime making new mounts for the encoders (position readout) on the 85-ft scopes. These mounts are stiffer and will hold closer tolerances and repeatability than the old ones. Infinite indexers are being built into the system for ease of zeroing. Snap on and off covers are being used for accessibility. In short, this should be a much improved system over what we had.

Ed Gardner and Maxie Gum spent one night indicating shafts and plates to insure a good working system and also to prove to Ray Hallman that they really could do precision encoder indicating.

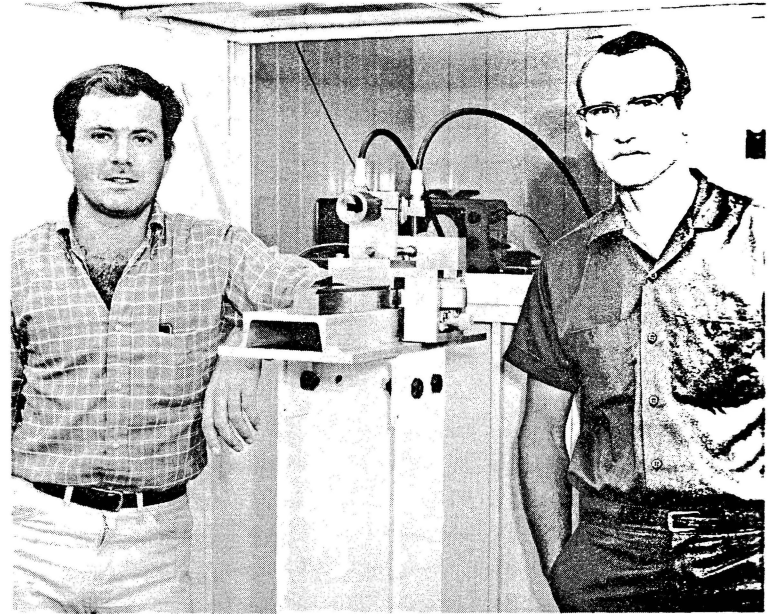
Maxie has just finished, and John Payne has checked out, a radar type antenna measuring instrument.* We used a Travel-Dial indicator to read out and repeat to .001 of an inch. That sure ain't much when a gear measures .003 of an inch. This system will eventually be used to measure the surface accuracy of the 140-ft scope.

The Sheet Metal Shop is now building a discone antenna for Jim Dolan and his Interference Lab. Jim says it is primarily for vertical polarization and, like a vertical dipole, gives an omnidirectional pattern in the horizontal plane; and if Jim says it, then it must be true. The original designers talk about the simplicity of construction and this may be true also. But Tony Miano will disagree with this statement when it comes to the flat pattern layout.**

Jim Coe and his interferometer group are helping the sheet metal fabricators busy building some new front-end boxes.

The instrument is housed in a small building in back of the lab and has been dubbed "Payne's vy".

Tony says, "You ain't just whistlin' 'Dixie'."



John Payne (left) and Maxie Gum with the
Antenna Measuring Instrument

KELLERMANN'S TRAVELS

Dr. K. I. Kellermann returned a few weeks ago from Pasadena, California, after a 3-month leave of absence to the California Institute of Technology. Dr. Kellermann reported that he was happy to be back — and most happy to escape the California smog! He is presently traveling the globe again — this time to Ottawa, Canada to attend the URSI General Assembly, and then to Moscow, accompanied by his wife, where he will be working for about 6 weeks in connection with the VLB experiment. John Payne and Barry Clark will meet him there. KIK says he hopes getting out of Russia is not as difficult as getting out of GB.

ELECTRONICS — CV

Jack Cochran

The millimeter lab—Neil Albaugh and Robert Eskanazy— are now preparing for telescope use a 9.5 mm parametric amplifier spectral line receiver. Also being developed as time permits is a 3.5 mm balanced mixer system. If phase-locking of mm klystrons proves to be successful, this system may see use as a line receiver.

Alive and well is former NRAO employee H. D. Logan, now with Sanders Associates, Nashua, N. H. It seems he devotes part of his time to a hi-G test facility — a 20 mm cannon firing a projectile full of semiconductors down a 250' tube. Sound characteristic?

Since Advance Technology of Timonium, Md., went out of business, the source of diodes has been a problem. However, we now have a year's development contract with Robert Mattauch of the University of Virginia. Out of the UVA-NRAO joint effort should come improved diodes for better hi-frequency front-ends.

NRAO's newest lab, created for research and development of low-noise parametric amplifiers, is headed by Dr. Jochen Edrich and aided by engineer Cary Young (new employee), Bernard Pasternak and Jack Cochran. A successful development is the dual 18 cm paramp system now being installed in a 140' front-end box. Due to novel paramp design and highly matched circulators, the system is paced at the state of the art. Each channel consists of a paramp cooled to approximately 20 °K followed by a second stage paramp at ambient temperature.

Future amplifiers will include a similar cooled 21 cm dual paramp system, and a single cooled 2 cm paramp. Also in development are uncooled degenerate paramps in the 24 GHz and 48 GHz range.

Art Shalloway, with the help of Robert Swann, is constructing model No. 3 of the correlator. It will incorporate new packaging techniques, contain 384 channels and will be for use at the 300' telescope. Used as a cross correlator, line work from the interferometer can be tested. A portion of the same design will be built for VLB project work. Also pertaining to VLB, the Varian computer for data processing has been received and checked.

In the future possible projects may be a 1024 channel correlator with a bandwidth of 20 to 50 MHz and/or a correlator for interferometer use. Also, consultation aid will be given to the Max-Planck-Institut for Radioastronomie, Bonn, Germany, in the construction of a correlator.

ELECTRONICS — GB

Ray Hallman

There's plenty of activity in the Jansky Lab. In the Standard Receiver Lab a new 2 cm front-end system is being designed for use at the 36'-telescope in Tucson. It is a tunnel diode system allowing excellent bandwidth properties. Such system is reportedly capable of a new 3 GHz bandwidth at a center frequency of 15 GHz.

The Interference Van is 95% complete. The van is currently in use detecting and pin-pointing radio noise sources in the areas that interfere with telescope observations.

A digitally controlled local oscillator system for tracking pulsar radio sources has just been completed in the digital lab. Pulsars differ from other sources in that they sweep across a radio band from higher to lower frequencies. The swept local oscillator system is said to make it possible to track the pulsars as they sweep down the radio spectrum.

The interferometer lab reports that a new dual-frequency system is under construction. This new system allows the telescopes to look at two different frequency bands during a single observing period, thus reducing considerably the required time to complete observations of a given radio source.

New radio receivers for 3 and 6 cm observations have just been completed in the front-end lab. These receivers offer the advantages of being small, compact, light in weight, and they contain their own power supplies making them extremely versatile.

Bill Kuhlken says, "These days a good vacuum is easy to produce — there's nothing to it."

LIBRARY

May Daw

F-L-A-S-H: NRAO libraries acquire top best-seller in non-fiction!

According to the Washington Post, August 3, 1969, the top non-fiction seller is The Peter Principle, by Laurence Peter and Raymond Hull. (New York, Morrow, 1969. \$4.95.) It sets forth a humorous account of Dr. Peter's theory that people advance in their jobs until they reach a position for which they are incompetent. Read all about it, in either library.

For breath-taking color photographs of this planet of ours, we recommend NASA's Earth Photographs from Gemini VI through XII, recently received in the CV library and on order for GB. This is a companion volume to the earlier Earth Photographs from Gemini III, IV, and V. Incidentally, if you'd like to own these magnificent volumes, they are on sale (prepaid orders only) to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20402, at \$8.00 for the later volume, \$7.00 for the earlier. A real bargain.

NRAO has received some welcome free publicity in Baker and Fredrick's An Introduction to Astronomy, 7th ed. (Princeton, N. J., Van Nostrand, 1968. \$7.50.) The book includes a number of black-and-white photographs of observatories, used as fillers at the ends of chapters. The large picture of our site is featured following Chapter 16. Also, the chapter "Telescopes and their uses" includes separate photos of the 140' and 300'. (Could this be because the co-author, Dr. Laurence Fredrick, is chairman of the Astronomy Department at UVA?) The book looks as if it would be useful for those of us who are not astronomers. One copy is now available in CV; two are on order for GB.

Wife, whose husband is stretched out on couch reading a book, to visitor: "Jim dropped do-it-yourself and switched to who-done-it."

140' TELESCOPE

Bill Hunter

Welcome back Observer. After considerable elapsed time between publications, we at the 140' are pleased to announce our instrument is still functioning fairly smoothly. Quite a few changes have been made to improve the operations and more are in the planning stage.

The hydraulic equipment has constantly been upgraded and revised under the able direction of Gene Marcum. The braking system was greatly improved by the elimination of piston-type accumulators and replaced by Greer-Bladder type. The declination braking equipment was moved out of the polar shaft to the declination drive platform and enclosed in heater housing, thereby insuring a warmer, shorter flow of oil to the braking units and also making maintenance much safer than the slick, treacherous footing in the shaft.

The oil reservoir on both drive units have been removed and piping run from the main reservoir in the basement, thereby precharging the drive unit subsystem pumps with circulated, warm oil, finely filtered. This is especially beneficial on the declination drive unit where, due to extreme attitudes of angle of the telescope, the pump was starved for oil on occasions, causing cavitation and wear. More efficient, fixed angle piston pumps have been incorporated into the main bearing hydrostatic systems and other components are constantly monitored and upgraded as may be required.

We at the 140' wish to express our thanks for the fine dinner and party given by Dr. Wilhelm Altenhoff shortly before his departure to Bonn, Germany. His stay here, for us, was certainly enjoyable, helpful and productive. We shall miss a fine, dedicated astronomer and friend. We surely wish for him the best in an exciting new venture at Bonn.

You can tell when you are on the right road—it's upgrade.

THE NRAORA

The following have been elected to the 1969-70 Board of Directors:

Leroy Webb ---- President
 Tom Carpenter --- Vice President
 Bev Weatherholt -- Secretary
 Dave Williams ---- Treasurer
 Wendell Monk
 Herb Hanes
 Jon Spargo
 Martin Barkley
 Maxie Gum
 Steve Mayor
 John Payne

Objectives for the Coming Year

- A. Adjustments at the swimming pool.
- B. Revision of the by-laws.
- C. Planning activities.
- D. Sewage system at Rec. Area.
- E. Re-carpet the miniature golf course.

Accomplishments

- A. Adjustments at the pool.
 1. Lifeguards only may eat at pool area.
 2. Swimming classes for children and adults were available.
 3. New Rule—Employee members and their spouse are allowed to bring an unlimited number of guests and dependent family members are allowed to bring only two guests per family member.
 4. Lifeguards are to decide where diving is permitted and who shall wear bathing caps.
 5. Ten bathing caps have been purchased for the pool for the guests who do not have one.
 6. No glass containers of any kind are allowed in the pool area (includes glass baby bottles, lotions, and oils).
- B. Pool Party - August 2, 1969.
- C. Picnic - August 9, 1969.

- D. It is hoped that the proper type toilets could be installed but the budget only allows us two more "out-houses".
- E. Re-carpeting of the miniature golf course was completed around Aug. 7.
- F. Headaches - from constant problems.
- G. High Blood Pressure - from never ending criticism and never a thank you.
- H. Ulcers - from worry and frustration.

Question—Why have a Board to make rules when they are constantly broken or overruled by someone else?

The Board of Directors meets the second Tuesday of each month at 3:30 p. m. in the basement of the lab. If anyone is interested enough, they are cordially invited to attend and voice their "suggestion".

GB KINDERGARTEN OPENS

The Greenvale Kindergarten will open September 8 and school will be in session from 9 to 11:30 a. m. each school day.

Children who will be 4 by November 1 are eligible.

For further information, contact Mrs. Troy Henderson, 456-4699.

WEDDING BELLS

Mr. Woon-Yin Wong (CV) and Miss Brigitte Kuhn were married on August 2, at 7:30 p. m. in the University Chapel. A reception followed at Woon-Yin's home.

Mr. and Mrs. Wong are now driving across the country to San Francisco; from there they will fly to Hong Kong to visit his family for about a month. Mrs. Wong is from Munich, Germany

Woon-Yin is an engineer and has been working with Dr. von Hoerner on the design of the homology telescope.

CV CHIT-CHAT

Phyllis Jackson

Dr. Mezger has been at the Max-Planck-Institut since June 27. Before he returns to the Observatory at the end of September he will attend the IAU Symposium No. 38 in Basel, Switzerland and the IAU-IUTAM Symposium in the Crimea. Mrs. Mezger and daughters are in Germany with him.

Dr. and Mrs. Barry Turner have moved into their new home on Greenbrier Drive.

Frances Copper, sons Pete and Patrick, and daughter Taffy, spent three weeks during June in England.

Mr. Jorn Wink returned to Munster, Germany on Aug. 6 to accompany Mrs. Wink to Charlottesville. They will live in the Crestview Apartments. Mr. Wink has been at the Observatory since June.

Kjeld Hvatum spent the summer in Norway with his grandparents and is expected home for the school term.

Dr. George Miley attended the AAS meeting in Albany the week of Aug 11. From there he drove to Quebec for a vacation in the Adirondack Mountains. He will return through Maine to Boston and then to Charlottesville.

Miss Janet Cook of Altrincham, England has been visiting Dr. Miley in Charlottesville.

Those attending the AAS meeting August 11-14 were: Dr. Rubin, Dr. Howard, Dr. Snyder, Dr. Hjellming, Dr. Miley, Mr. Webster, and Dr. Weinreb.

Dr. David Hogg and family vacationed in Richmond Hill, Ontario the last weeks in Aug.

After a week at the beach with his family, Dr. Howard returned to the office on August 4 with a very handsome suntan.

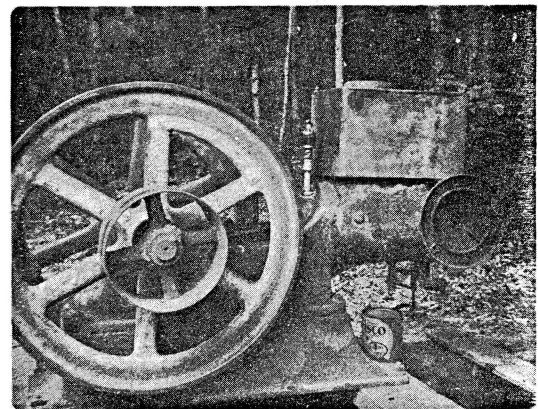
Vacations are great levelers. The person who takes one returns home just as broke as the person who stayed home because he couldn't afford to go away.

STRANGE HOBBIES OF NRAO PEOPLE

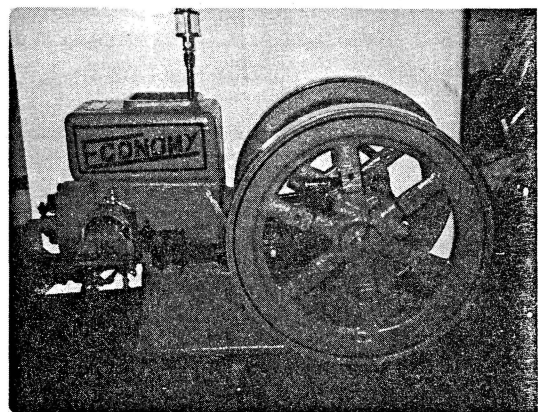
Ira Jeffries

"Poppin' John" is the name given to old time gasoline engines. After hearing one run, the name derivation becomes obvious, with their "hit and miss" principal of operation. Most of them were built between 1904 and the mid 30's, built as a horizontal single cylinder open crankshaft with horsepower ranging from 1 to perhaps 50. These engines saw widespread use on farms and industry, powering most everything that had previously been powered with steam.

The restoration of these is a hobby enjoyed by quite a few NRAO personnel. Richard Skaggs, Carl Wooddell, Henry Taylor, Steve Mayor, Ira Jefferies and Merritt Gum (ret.) are all afflicted with "Poppinjohnitis".



A 5-1/2 HP Majestic owned by Steve Mayor



A 2-1/2 HP Economy owned by I. Jefferies

PLANT MAINTENANCE

Helen Carpenter

A big day for our Division in the past has been moving of the interferometer telescopes; however, since the arrival of the new dollies from Blaw-Knox, this job has become much easier. On the average, we make about one move every two weeks.

We wish to give a big thank you to our summer employees, our regular ground crew, the Neighborhood Corps boys, and to Mrs. Kay Williams and her helpers who cleaned up the site and made some great improvements with flowers and pruning of the trees.

Odell Johnston has joined our Division as a mechanic in the Automotive Shop.

In each issue of the Observer we shall try to give a report of the work done in one of the shops or sections of our Division. This month we will bring you up to date on the Paint Shop. Jim Simmons flew to Tucson July 20th to supervise painting of the surface of the 36' scope. Jim returned July 26th. He and Benny White have painted the legs, dishes, and relay buildings of all three 85's this summer. They are in the process of painting the hallways and entrance of the 140'. John Riley has been painting the exteriors of the houses this summer. This spring the rooms at the Residence Hall were painted before new carpet was installed (see article on "Residence Hall") and the auditorium of the school was painted in preparation for the tours. Shop work includes painting of front-end boxes and panels for Electronics.

Merritt Gum, one of our ten year employees, retired July 1, 1969. Merritt was honored with gifts and a Division picnic at the Recreation Area on June 28. We wish Merritt the best of luck and many happy days for the future.

Paul Devlin has gone into the "bird dog" business with the acquirement of an Irish setter named Lynn. See Paul for puppies at \$250 each.

Troy Moore has been conducting "hay making schools" on various sunny days this summer. Location: Back Mountain; tuition: reasonable; students: Jim White (one lesson was sufficient) and Carl Harmon (when he can be persuaded). The extra benefit is Carl's cornbread and brown beans for supper.

On the Plant Maintenance sick list:

Bruce Nottingham - now recovering at home

Adolphus Shears --- " " " "

Pat Hall ----- at UVA hospital

We wish each a speedy recovery.

BIRTHS

Charlene Ruth, 8 lbs. , born 7/31 - daughter of Mr. and Mrs. Bruce Balick. Bruce is a graduate student from Cornell University doing his thesis research at the NRAO. This is the first child.

Christopher Daniel, 6 lbs. 8 oz. , born 7/23, son of Mr. and Mrs. Daniel Vitiello. Dan is a programmer in the Computer Division. This is their first child.

James Scot, 8 lbs. 6 oz. , born 7/23 - son of Mr. and Mrs. Cary Young. Cary is a new electronics engineer working with Dr. Edrich. The Youngs have other children.

Sven, 7 lbs. 4 oz. , born 7/31 - son of Dr. and Mrs. Yervant Terzian. Yervant did his thesis research at the NRAO and is now Assistant Director CRSR, Cornell University. It just happens that Dr. Terzian is also Bruce Balick's advisor - Bruce learned that he was to be a father just one day after Dr. Terzian learned he was to be a father. Their babies were born just a couple of hours apart.

Jeno Shannon, 6 lbs. 8 oz. , born 7/14, son of Mr. and Mrs. Benny White. Benny works in the Paint Shop of the Plant Maintenance Division.

A woman who runs a nursery school was delivering a station-wagon load of kids home one day when a fire truck zoomed past. Sitting on the front seat was a Dalmatian dog. The children fell to discussing the dog's duties. "They use him to keep the crowds back," said one 5-year old. "No," said another, "he's just for good luck." A third child brought the argument to an end. "They use the dog," he said firmly, "to find the fire plug!"

SUMMER STUDENT IMPRESSIONS

Four summer students (two from GB and two from CV) were asked what their impressions were of the NRAO summer program. Dave Shaffer, Eddie Tsang, Mike Allen, and Paul Kitner commented as follows:

Dave Shaffer, 1st year graduate, Cal Tech, GB — I think the summer student program is great. Of course, I'm prejudiced by now, having been here four summers in a row. The first year I came, it was just a summer job. It was interesting, though, and I was impressed enough by Green Bank (Observatory and location) to want to come back again. By the end of that summer I was hooked on astronomy. This is an example of the way the program can introduce (radio) astronomy to students of math, physics, and engineering who might otherwise miss its excitement.

Then there are the side benefits for the students. First, there's the Hannah House, a rather decrepit old farmhouse that's annually subjected to the use and abuse of eight to ten male college students. So far, it has survived and the cam developed there has led to memorable events. Various escapades come to mind: the transplantation of the old 300-ft feed mockup from outside Jaap Baars' office window to his front step, joyrides on the caterpillar tractor, summer student parties ending in beery oblivion, fireworks and potassium chemistry, and last but not least, the appearance of that learned journal of astronomy and other mundane topics, the Journal of the Pocahontas County Astronomical Society (better known as JOPCAS).

To justify ourselves, we also do a good turn or two for the Observatory. The scientific staff would drown on unreduced data if it weren't for the ardent computer programmers (?) (thank God for Ken Braly). Now, they drown in output. Some 100,000 tourists a year see us as tour guides and 300-ft telescope crew. I can remember getting up several times at 2 AM to check on 3C454.3 and friends' erratic behavior at 2 cm.

The NRAO Summer Program with its lecture series and informal mixing of students and staff is a great way to spend the summer, earn a little money, learn a little astronomy, cure the New

York City syndrome,* and make some new friends. I'd recommend it to all. D.S.

Eddie Tsang, 3rd year undergraduate, Univ. of Toronto, CV — The NRAO summer student program is an excellent one. It is the best summer student program I have ever joined or come across. The lecture series are well organized to give the student a good idea of what radio astronomy is. However, some lecturers are too ambitious—they tried to give more material than they could give within the lecture hour. It would have been better if some lectures had lasted a bit longer.

I, as a computer science major, have really benefited from the program. I have learned what radio astronomers are doing. As you know, computer is one of the chief supporting facilities for research in radio astronomy. It is going to be very helpful in my future career. The benefits have almost gone too far: I am considering on going to astronomy in my graduate school. Had it not been for the advantage I am enjoying in computer science, I would not have decided to go into astronomy. E.T.

Michael Allen, 1st year undergraduate, Ohio State, GB — It has been a most rewarding experience to work at Green Bank this summer. Working in the lab and the lectures have greatly increased my understanding of radio astronomy. One of the outstanding features of the summer student program is that the students have been able to use the 40-ft telescope. I feel there is no other program which can equal the one here at Green Bank. M.A.

Paul Kintner, 1st year graduate student, Univ. of Minnesota, CV — The summer student program does a good job at meeting the needs of the undergraduate but still allows the older student time for his own needs. However, the essence of the program is really contained in the advisor-student relationship. No matter how the

Continued --

* NYC syndrome is a curious sort of inverse claustrophobia, apparently caused by complete lack of tall buildings and movie theaters.

program is conceived or executed, it will only be as successful as that relationship.

I think personal success in this program should not be judged in terms of new equations memorized or new computer languages learned but rather in building drive and motivation to continue studying in this field. This again is a function of individual personalities rather than the formal structure of the summer program. P.K.

ON THE TRAIL OF THE WILD FRUIT

Wally Oref

This year has been one of the best wild fruit seasons for some time. Ole man frost failed to lower the white knife this spring and fruits and crops bloomed profusely without damage. First to bloom was the "sarvice" tree (serviceberry, Juneberry) and they were almost a solid white. If you failed to pick a "mess" of red-ripe "sarvice" berries in June, you missed a jam and pie delight.

Next to ripen were the wild strawberries and low bush blueberries (evergreen and about 8" high); both take time to pick but both are worth the effort for their exquisite taste. Ripe wild strawberries and low bush blueberries are ready on the sunny slopes about June 25. We missed picking black raspberries this year because of vacation, but I'm led to understand there were plenty for anyone who wanted to put forth the search and effort.

Blackberry bushes were loaded this year and could be picked by the waterbuckets full. Blueberry, while plentiful, were harder to pick but a pint of fresh blueberries go a long way in muffins and pancakes. The blackberry season in our area extends into September, where in the mountains they ripen rather late. Huckleberries will be available until about mid-September. About September 1, high bush huckleberries will be ripe in the higher mountains (i. e., on Bald Knob). These berries grow on bushes about five feet high and are the size of small marbles—wonderful pie makers. Towards the latter part of the month, if the frost doesn't kill them, look for "Bear" berries (both bush and berry look like blueberry).

While poor tasting raw, they make excellent pies when cooked. These are the last of our berries. By this time start looking for snow berries.

This area is blessed with a variety of excellent wild fruit. It's a shame if you haven't eaten jam, cobbler or pies made from our wild fruit. But if you had plenty of all three, you can always convert the surplus into excellent wine. (This is a whole new subject and may be explored in a later Observer issue.)

DID YOU KNOW THAT, according to the 1969 edition of Accident Facts, accidents in which death or injury occurred, together with non-injury motor-vehicle accidents and fires, cost the nation in 1968 at least

—> \$22,700,000,000. <—

The Safety Program of the NRAO will be discussed in the next issue of The Observer.

PICTURE YOUR AD HERE

If you have something to sell,
to trade, wanted, found,
strayed, or stolen, let us know.
Next due date: October 14, 1969.

36-FOOT TELESCOPE

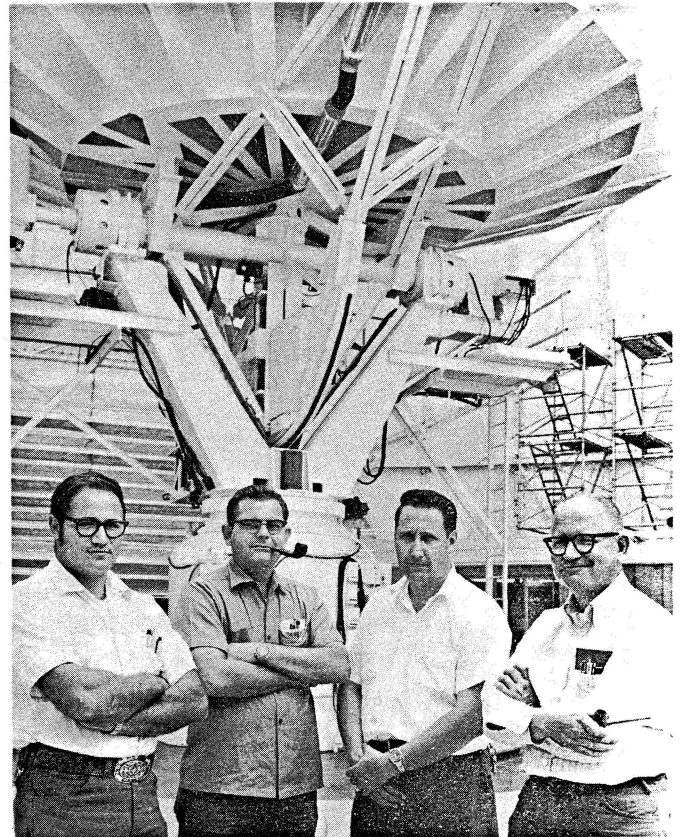
George Grove

The July-August rainy season has descended on Tucson right on schedule and the 36-ft operation has been turned into clean-up, paint-up, fix-up routine. KPNO people have been taking care of the clean-up aspect with their usual efficiency and the painting phase was completed by Jim Simmons, who came out to put a standard NRAO white-wash on our little reflector. The fix-up process for these two months was directed by Bill Horne and involved measurements and repairs on the dome door, reflector, and the focus alignment. Rohr Corporation furnished two men for the dome door work (Gene Rischard and Joe Silva) and John Ralston has been out to take measurements on the dish and focus area.

The highlights of this summer's rains have been the lightning displays on the top of Kitt Peak which have demolished one of our low frequency antenna poles, and also brought out some interesting characteristics of both our commercial power and our emergency generator system. Both encoder systems on the telescope have had electrical-type outages possibly caused by the lightning and power line problems. Our elevation encoder is still out, waiting repairs and replacement by Wayne-George Company — a company not noted for speed in such matters. The water vapor project has also enjoyed some lightning problems and the unit located at the foot of Kitt Peak is currently off the air with a variety of outages. Dick Bloomingdale, our part-timer running the operation, is getting a rather good workout in troubleshooting.

The old timers here have worked in some vacation this year. Don Cardarella spent his pretty close to Tucson, while Johann drove up along the mountains into Canada and back along the coast, to get a good view of Western America before returning to school and Mezger's Empire in Germany this September. Yours truly took vacation in the form of a 3,000 mile endurance drive test, which my poor little car passed with drooping colors and availed, utterly wiped out by interstate exhaustion.

Our two new people, Bill Daniel and Bob Hogarth, persevered through the confusion and we are all looking forward to a more normal observing routine in September.



(l. to r.) Don Cardarella, Bill Daniel, Bob Hogarth and George Grove

ONLY JOKING — A drunk fell from off the 36-foot dome and hit the ground with a resounding impact. A crowd gathered, and as the drunk staggered to his feet, George rushed in and grabbed him by the arm, asking, "What happened?" The drunk replied, "I don't know. I just got here."

