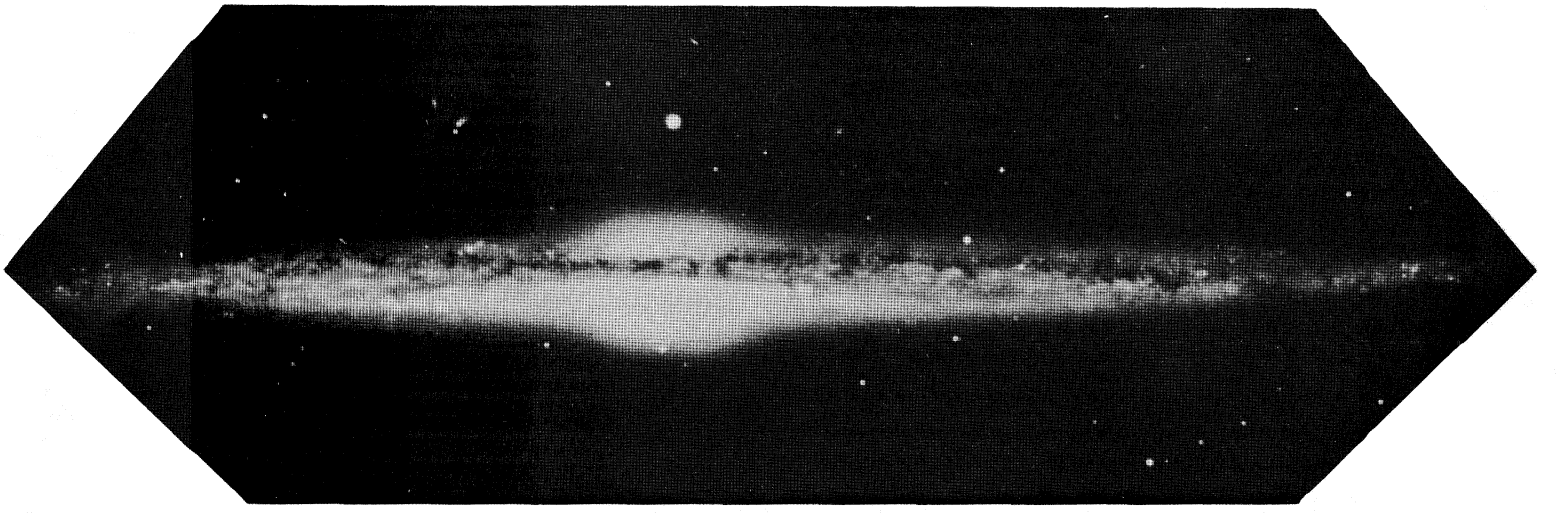
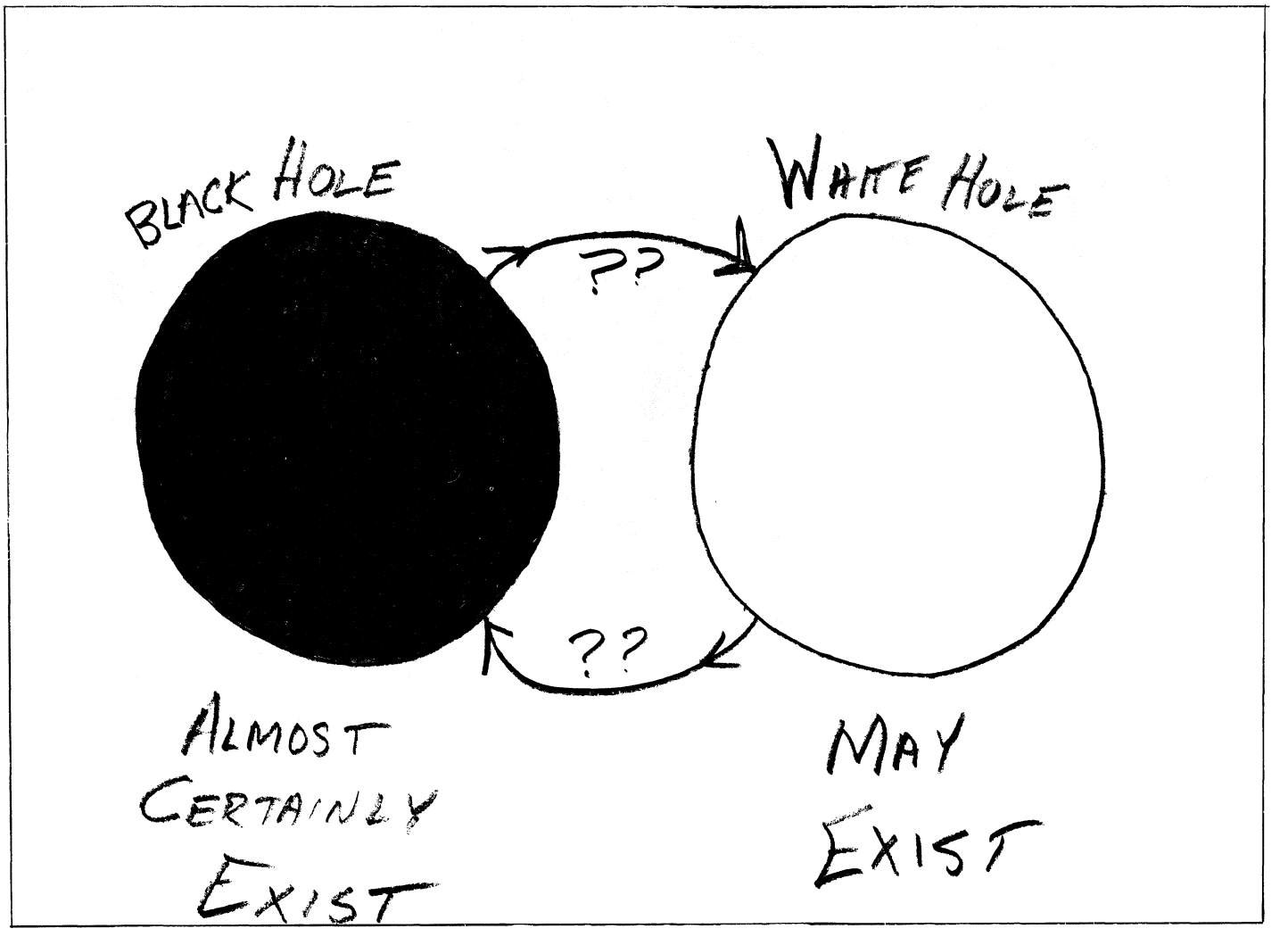
The OBSERVER

Vol. 12, No. 4 July 1971 Page 1





Black Holes - White Holes

(Story on Page 3)

NOTE FROM THE GUEST EDITOR

Some naive soul once remarked that, "Summer seems to be the silly season in Green Bank." Therefore, as guest editor charged with recruiting articles for this issue of the "Observer", it is my hope that the current edition will tickle your fancy.

I would also like to add my thanks to all those who contributed to this issue and to the "corps" of the "Observer", regulars-irregulars (choose one) who helped to produce this edition.

Jon Spargo

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Editor's Note: In April, members of the Editorial Board agreed to solicit articles for the May, July, and September issues. Mark Gordon rounded up articles for the May issue, Jon Spargo did it for this issue, and Mike Davis will do it for the September issue. We appreciate their help and effort; they, I'm sure, appreciate your help.

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A special thanks to all of those who helped assemble the OBSERVER.

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The OBSERVER is a bimonthly publication of the National Radio Astronomy Observatory, P. O. Box 2, Green Bank, West Virginia 24944.

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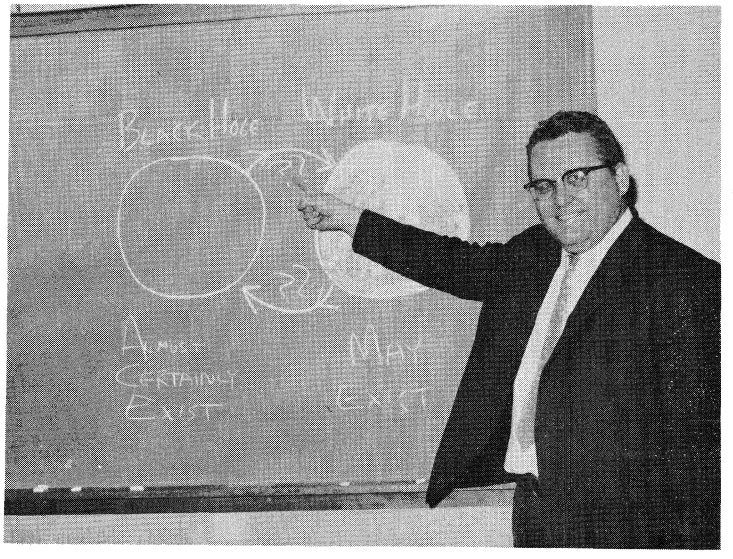
BLACK AND WHITE HOLES

R. M. Hjellming

Black holes are liberally describable as "holes" in which matter disappears from our universe. A white hole occurs wherever just the opposite happens. Of course, black holes "produce" white holes and white holes provide new matter out of which more black holes can be formed.

No, the previous paragraph is not taken from a science fiction story.

The purpose of this article is to describe why such ideas are now being seriously discussed by astronomers. In recent times the existence of black holes has been seriously proposed, and most astronomers would agree that they should exist. The idea originated because the study of evolution of massive stars has forced astronomers into a dilemma. We know, or at least we are pretty sure, that only stars of relatively small mass can attain certain stable states in which, perhaps, they can remain until the end of the universe. But many stars are much more massive than this. Up until a few years ago no one worried about the problem; everyone just assumed that the massive stars would lose just enough mass so they could settle down as nice, comfortable dead stars of low mass. However, ignoring a problem doesn't make it go away, and no one has ever been able to see or prove the existence of enough mass loss to make this theory work. The idea of the black hole was then introduced. What happens is that the too massive star eventually exhausts all energy supplies that can combat gravitation, and the gravitational forces that make stars collapse win in the end. With further collapse the gravitational forces get even stronger, forcing faster collapse, which increases gravitational forces, and so on. With our present knowledge of physics, there is nothing to prevent the star from collapsing to a point. At some stage in this collapse the forces are so strong no matter or radiation can escape, thus the "hole" into which the matter is collapsing is called "black". The outside universe would "see" their presence only through their gravitational influence, which would be nothing more than that normal for stars -- except very near the collapsing stars. In this region, generally considered to be of the order of a few miles in diameter, any incoming matter of radiation is captured forever.



Hjellming explaining his theory on Black Holes-White Holes.

Anyhow, a few sentences back we left outselves with the dilemma that we had stellar masses trying to collapse to a point. Furthermore, as far as the matter is concerned, it must do this in a very short time. There is no doubt that phenomena completely beyond known physics must then occur. There are obviously two options: (1) new forces, presently unknown to us, could intervene and stop the collapse, forming a strange, stable object; or (2) the matter really does pass through a point going elsewhere -- whatever that may mean. A couple of years ago it was said that the matter could be "crushed out of existence." However, this is very unsatisfactory, because physics is dominated by conservation principles. You never get something for nothing, and you can never make something completely disappear -- you can only change it.

Continued, next page--

At this point, as we creep up on the concept of the "white hole," we should mention another astronomical problem. In the last decade, quasars and the centers of galaxies have been found to be sites where enormous energies are being expended. The basic source of this energy is still unclear. If one really believes in fundamental conservation principles, it is tempting to speculate that such phenomena, and the fantastic energy supplies, are the result of "white holes," which are regions surrounding a point where matter, once in a black hole, is "coming out the other side."

This suggests two possibilities: (1) the black holes in our universe pass matter, in some unknown way outside our present knowledge, to white holes at other points in our universe, or (2) there is more than one universe and the black holes of one supply the white holes of the other, and vice versa.

There is a special attraction in the idea of two universes coupled to each other, and "seeing" each other, only through the black hole - white hole transitions. One can then generalize the idea of our universe being like the surface of an expanding balloon -- a concept often used to explain the observed expansion of our universe. What happens is that one universe is on the outside "surface" of the balloon, while the other is on the inside "surface." Neither affects the other except with "holes" through the surface, which would be the black hole - white hole transition. "Loss" of matter and energy on one "surface" results in a source for the other "surface." In each universe, conservation laws may not apply whenever the volume considered contains a white hole or a black hole; however, conservation laws are obeyed when both universes are considered.

Another attractive idea is that the black hole - white hole transition involves matter on one side and anti-matter on another. This would help solve the long-standing problem that, although we can create anti-matter, and we believe that matter and anti-matter should be equaled in amount, our universe seems to contain mostly matter. Again, this violates a basic conservation principle, unless it applies only when the two universes are considered together. The initial creation event for the universe could have been basically creation of matter -- anti-matter universes which then expand, as in the balloon analogy, together, with exchange of matter only through the black hole - white hole transition.

Anyway, that is what black and white holes are. If it would ever be shown that both exist, it would open a fantastic new vista for both astronomy and physics.

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36-FOOT NEWS

Bob Hogarth

Well, summer is finally with us in the land of the Big Blue Sky. The old heat-gauge has been over 100 a few times. No wonder the beer cans are popping, and the swimming pools are cooling.

There are several additions to our Tucson family. On May 27th, at 7:14 AM, Chuck and Linda Lipscomb were blessed with a 9-pound, 3-ounce boy, Michael Edward. Michael has a 4-year-old sister, Shiela.

We have two summer students with us this year. Linda Dressel comes to us from Cincinnati, Ohio, where she graduated from the University of Cincinnati, Phi Beta Kappa. Her degree is in physics, with a specialty in relativity. She will be working with John Rather this summer, and this fall will be going to Cornell, where she will be doing graduate work in astrophysics.

Bob Freund, from Lancaster, Pennsylvania, comes to us from VPI+SU, in Blacksburg, Va. He graduated with distinction from the Electrical Engineering Department, Tau Beta Pi, Eta Kappa Nu and Phi Kappa Phi. After working this summer with Dewey Ross, he will be going to MIT, doing graduate work in microwave.

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WEATHER IN GREEN BANK???

John Weaver

And now, a word about the weather. There is no official National Weather Service Station at NRAO; however, since information about the atmosphere above the telescopes is important to observers, certain weather data is recorded. Much of this information is summarized and stored on a continuing basis and is used to aid in telescope scheduling.

A continuous record of cloud cover is maintained for each eight-hour period as well as any significant weather phenomena such as rain, snow, fog, etc. Daily maximum and minimum temperatures are also recorded. Separate records are kept of station barometric pressure, temperature, and dew point. These are continuously monitored by recording instruments. Complete data is on file, going back to 1 January 1967.

Since I was involved with meteorology in the U. S. Naval Weather Service for several years, the subject holds a great deal of fascination for me. I find the weather at NRAO especially intriguing since we have our own micro-climate in the Deer Creek Valley. As anyone who has followed weather reporting and forecasting by the usual media (i.e., radio, T.V., and newspapers) knows, the weather here just doesn't fit what they are talking about. This is due primarily to our mean elevation above sea level, together with the fact that we are completely surrounded by high mountain ridges. I have observed on several occasions that clear skies were being reported all around us at places such as Elkins, Charleston, Roanoke, Harrisonburg, and Martinsburg while we were getting soaked.

In future articles I will present some information on how our weather is affected by various parameters such as movement of fronts and air masses, terrain, our location in relation to the ocean and other weather producing areas. I don't expect to make an instant forecaster of anyone but really it is quite simple. All one needs to do is after observing a sun-doggie, look for a woolly worm crossing the road, note whether north to south or south to north, check whether the black band is on the north or south end and.....

WOOLLY WORM WEATHER FORECASTING CHART

X Worm Proceeding South to North

II. Don't bother getting the picnic gear out of the attic - this summer is going to be a lulu. Forget the garden also.

I. Should have nice summer but watch out for a few gully-washers.

Y — Y

Black Band on South End

Black Band on North End

III. If you're hoping for a white Christmas, forget it! Sit back and enjoy watching them dig out of it up north on the 6:30 news.

IV. Plan to spend most of the winter indoors. Lay in extra supplies. Don't pick any unnecessary fights with your spouse. It's going to be a long winter.

X = Worm Direction Axis
Y = Worm Black Band Location

X Worm Proceeding North to South

CROSSWORD PUZZLE

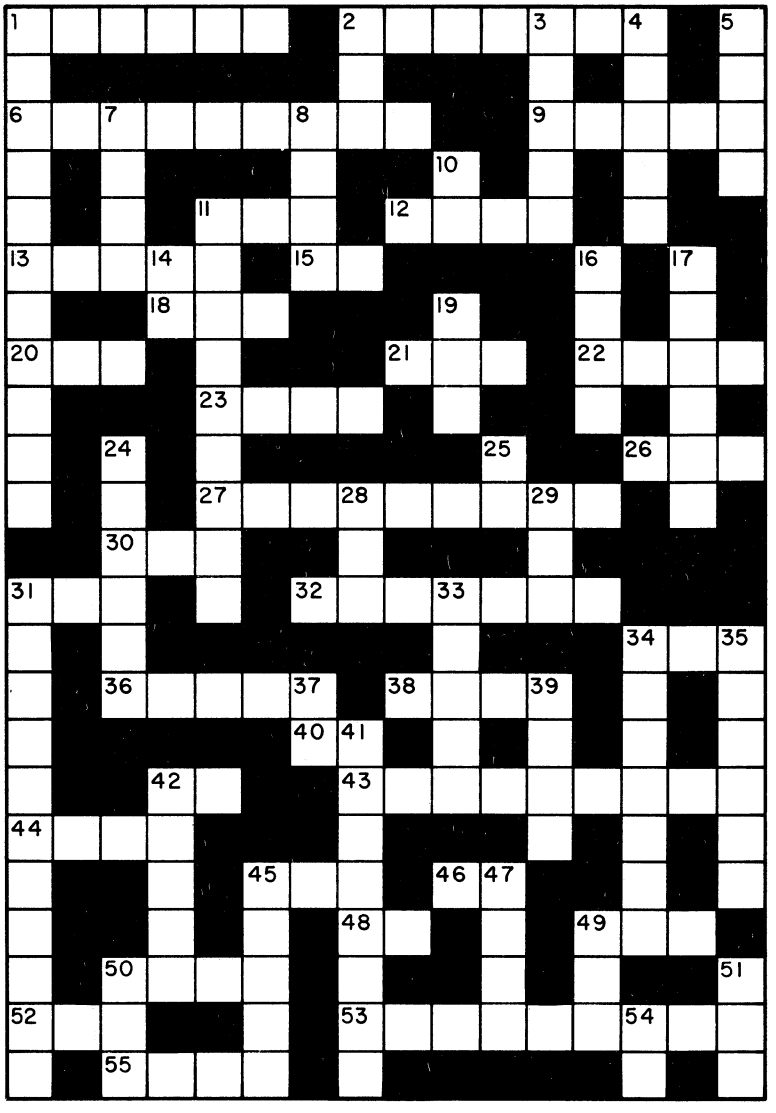
Joanne Nance

ACROSS

1. Jovian planet
2. Vernal or Autumnal
6. Horoscope science
9. Units of force
11. Chronological _____
12. 365 mean solar days
13. UV spectral lines (series)
15. A direction
18. Galaxy classification
20. The Sun
21. Receding tide
22. Lunar phase
23. Moon caused force
26. Martian hue
27. Equator/ecliptic angle
30. Aries
31. Star coordinate (abbr.)
32. Property of a body that resists change in motion.
34. Depression
36. A planet
38. Light ring
40. Stars, _____ Lyrae
42. East-west coordinate
43. Astron. data book
44. Super _____
45. Constellation
46. Stellar distance unit
48. Unionized hydrogen
49. Age of Pop. II stars
50. Law of planetary distance
52. A celestial sphere
53. Rare transitions
55. Trig. function

DOWN

1. Group of stars
2. Energy unit
3. 180 from Zenith
4. Inert gas
5. Weight
7. Observing group
8. Type of star cluster
10. Alpha particle
11. Units of length
14. Indefinite article
16. To elevate
17. Hydrogen series
19. Spectral indices
24. Conic section
25. 3.1416
28. Charged atom
29. Three (pre.)
31. North-south coordinate
33. To extend
34. Daily
35. Pulsating radio source
37. Color-magnitude map
39. Units of resistance
41. A longer wavelength
42. Type of telescope
45. Type of cloth
47. Famous Nebulae
49. Unusual
50. Type of spectrum (abbr.)
51. Supernova remnant (abbr.)
54. Current



Solution will be posted on bulletin boards several days after the Observer is distributed.

LIGHTS IN THE NORTHEASTERN SKY

Len Howell

On a clear night and when the NRAO 42-foot telescope is operating, you may see a bright light in the northeast. The light comes from our 42-foot site located on Spencer's Ridge.

We bought the 42-foot telescope in 1967 for the specific purpose of testing a phase stable interferometer using a microwave link. This was a prelude to the VLA. Experience gained from using the 42-foot for this purpose showed that it was a useful scientific instrument.

In the early days of the telescope's operation, two operators were required (one at the 42' and one at the interferometer in Green Bank), and these two people had to have constant communications with each other. Now we operate the 42-foot and three, 85-foot antennas from the interferometer control building with one operator.

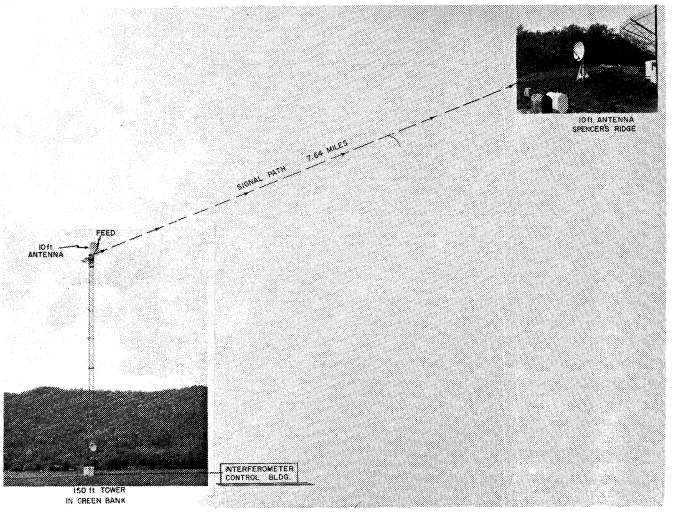
Many people (not electronically oriented) have asked how we operate a distantly located telescope with no wires connecting the control panel to the telescope drive motors. We do it with a microwave link; this microwave link at the control building can be compared to a radio station transmitter and the receiver at the 42-foot can be compared to the radio in your house. However, our microwave link has more channels (frequencies) being transmitted than the radio station transmitter and our receiver is tuned to receive only the transmitter signal, whereas you can tune to different radio stations (frequencies) on your home radio.

To move the 42-foot telescope west at fast speed, the operator pushes a switch on the control panel labeled SLEW WEST. This sends 24 volts D.C. to a small oscillator which sends a tone signal into one channel of the microwave link transmitter. The transmitter sends the tone by cable to the feed at the focus of the 10-foot, dish-shaped antenna on top of a 150-foot tower. This tower is located north of the interferometer control building. The signal from the feed is transmitted by the dish to an identical dish at the 42-foot. (See photo). This dish reflects the signal to its feed and the signal is carried by cable to a tone receiver in the 42-foot control room. Here the receiver supplies 24 volts D.C. to a relay coil causing the relay to close its contacts which carry 110 volts A.C. The 110 volts go to a 110 volt relay coil causing the relay to close its contacts which carry 220 volts 3 phase A.C. The 220 volts go to the slew motor which makes the telescope move west. Moving the telescope in different directions and moving the telescope at different speeds is accomplished by energizing different tones and relays in the same manner as for slewing west.

Numerous signals, such as receiver L.O. and I.F., telescope positions and limits, wind velocity, outside temperature, etc., are transmitted and received continuously via the microwave link.

The power (110 and 220 volts) at the 42-foot is supplied by a 25,000 watt generator driven by a diesel engine located on the 42-foot site. The diesel engine is not controllable from Green Bank. Therefore, occasionally we have to drive up to the 42-foot site to check it.

Keep in mind that the 42-foot telescope is operated by a remote control microwave link from the interferometer control building and the light you see at night is from the 42-foot site.



Microwave link between interferometer control building and 42-foot site on Spencer's Ridge.

1970-71 N.R.A.O.R.A.

Jon Spargo

This has been a year of transition for R.A., as many changes have come about. To say that things were hectic is an understatement. The board of directors put in a full year of hard work, and before we progress further here, I would like to publicly thank all of them for a job well done under some difficult conditions.

As you know, the past year was the first year we operated under a non-dues paying system. While in the long run this should prove to be an easy method, the transition last July was not so easy. First, we had to really give a hard look at all the things we spend money on. We then had to prepare a budget for the July-Dec. period. Another budget was necessary in January since changes in the by-laws stated that the R.A. fiscal year had to conform to the Observatory fiscal year. Some more comments on the 1971 budget later.

Through all this, the regular activities proceeded pretty much as usual. The following is a list of the activities to date sponsored by your R.A.:

1. Summer picnic
2. Adult pool party
3. Teenage pool party
4. 2 Clay days at the pottery workshop
5. Halloween dance
6. Xmas party for children
7. Xmas dance for teenagers
8. New Year's dance (Note: the New Year's dance this year will be on New Year's Eve with music by the Esquires).
9. Valentines dance.

In addition, several sporting activities were sponsored such as bowling, both in Charlottesville and Green Bank, with a resulting tournament; basketball, and resulting GB, CV playoff; and softball.

Under the general heading of facilities, some improvements were also made. The softball diamond was moved to its present location and work was started on building a backstop. Also, the field was graded and leveled. This project is near completion and shows what can be done when people are interested enough to volunteer their time. The rifle range also underwent a partial face lifting, which is still in progress. The only major thing that hasn't been completed there is a firing line canopy. This is due mostly to a directive from NSF-AUI stating that there will be no capital improvement expenditures this year. Several other proposed projects suffered from this directive as well. In addition, we are presently working on the pool room and should have it open in the near future.

This brings us up to the recent elections. Those elected to the board were:

Richard Fleming
Jane Chestnut
Pearl Clarkson
Don Stone
Craig Moore
Carl Davis
George Liptak
Dave Williams
Tony Miano
Marvin Wimer
Dorman Williams

Of these eleven, five will serve an eighteen month term until January 1973. The remaining six positions will be filled in elections this November and those elected will serve a two year term. The present five who will serve eighteen months were selected by virtue of the number of votes they received. The five highest were:

Richard Fleming
Jane Chestnut
Pearl Clarkson
George Liptak
Craig Moore

The new board has met and selected its officers. They are:

Richard Fleming	-	President
Craig Moore	-	Vice President
Jane Chestnut	-	Secretary
Pearl Clarkson	-	Treasurer
Carl Davis	-	Purchasing Agent

Officers will again be chosen in January when the board again convenes after the November elections.

Continued, next page--

Obviously, to cover each and every little thing that happened over the past year would be quite time consuming both for me to write and for you to read. So, I would like to close by offering, first of all, a sincere thank-you to all that helped during the past year, and second, by offering my congratulations to the new board of directors.

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The following report was received from Germany describing the ADVENTURES OF BARRY CLARK AND THE NOTORIOUS VLB TRAVELING CLOCK

Last week was shot, thanks to Barry's visit. He called to say he was driving up at 3:00 p.m. Saturday the 8th, and I agreed to look after him, to take him to Effelsberg on Sunday, to set the clock, and to arrange for a technician to be there. Saturday I sat in the empty MPI. 3:00 p.m. came, and no Barry. At 6:00 p.m., I tried to call Leiden, where he was supposed to come from. Nobody was there. I called to Westerbork and the operator tried to reach George Miley, who was chaperoning Barry, but no luck. Finally around 9:00 p.m., I stuck a note on the door telling him which hotel he was booked at and left. Sunday I came in again early, still no Barry. He had not checked in. I sat around for a couple of hours before trying Leiden again, but no luck. I stuck another note on the door and went home for what remained of the week-end. Finally, Monday, he called and said they had lost the clock and if they found it, he might come that night.

(continued - much later)

Barry eventually turned up, with the clock, which had been sealed up by Dutch customs, and before he could open it he needed permission from German customs. So on Tuesday, with Heinz Wendker as interpreter, we trooped down to the main customs in Bonn -- no go! They wanted $8000 deposit for it to be opened. The money would be returned when proof of re-export was given.

We returned to that institute, and someone suggested, "Call so-and-so, he is an expert on customs" (kind of a Bill Powell, only here you don't know such people exist, you have to look for them in the woodwork). So we did -- no problem, he knew the customs man at Euskirchen, in whose district Effelsberg is.

The customs expert came with us when we drove down to the telescope. He watched Barry open the crate and noted down the serial number (actually, he wrote "HP5065 or whatever," but we didn't tell him). After we gave him a tour of the site, he went off.

Everyone was falling over Barry's crate rushing around the control room with cans of paint and "typical" records for the dedication on the following day. CHAOS! Barry discovered that the 100's of m sec delay switch didn't work. So he set it by beating time with his foot to the tick of our clock and trying to turn the power on at exactly the right moment. I guess he computed the sound-travel-time and reaction time in his head; anyway after about 30 tries, he got it set. Then we left it in the lab on charge, climbed around the dish a bit and went home to eat.

Next day he had to take it back to customs to reseal it with the power cord hanging out. However, having got it back to Bonn, he discovered the seal had broken while manhandling it in and out of car trunks, so Thursday, on his way to Holland, Barry had to go back to customs again.

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Safety Limerick

On the job Spike was bearing down hard;
Tried to speed by removing the guard;
But the blade made a skip--
Gave his finger a rip--
Now he bogeys the holes he once parred.

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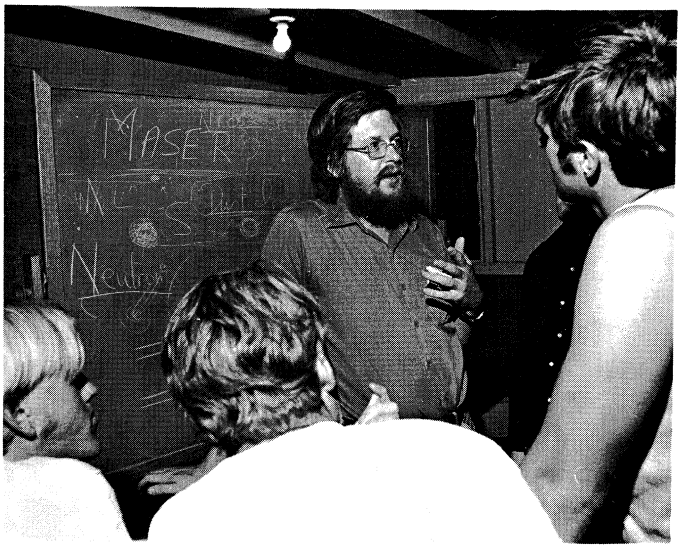
NATIONAL YOUTH SCIENCE CAMP VISIT

W. Oref

On June 23, 1971, the NRAO was host to almost 100 members of the National Youth Science Camp. Campers were given a three-hour tour of the site and facilities. David Hogg welcomed the group and gave the introductory talk. Guides for the three groups of campers were Mike Davis, Bill Brundage, and Bob Vance. In addition to the guides, knowledgeable people were stationed throughout the site to answer questions and explain facilities.

One group of campers taking a break before Dolan's talk on the interference van.

NRAO also provided three staff members who went to the Camp at Thornwood and gave lectures. G. Verschuur brought the delegates up to date on heavy molecules in interstellar space. R. Hjellming talked to them about recent advances in astrophysics, and W. Horne discussed the construction of the 140-foot and showed the highly popular movie about the construction of the 140-foot.



Verschuur lectures to campers on recently discovered molecules in interstellar space.

The National Youth Science Camp is sponsored annually by the State of W. Va. for the nation's top science students -- two young men from each state. The NYSC presents a unique educational and recreational program led by representatives from the academic fields, industry and government.

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You cannot help men permanently by doing for them what they could and should be doing for themselves.

You cannot build character and courage by taking away man's initiative and independence.

--Abraham Lincoln

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THE CHARLOTTESVILLE FIRE

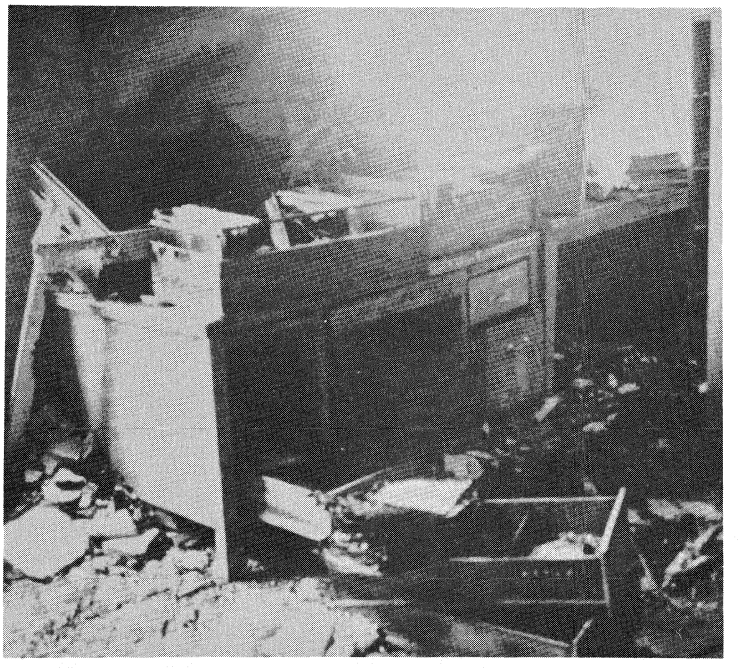
G. L. Verschuur

It's one thing to turn over a new leaf, but another to burn all the old leaves! Even after turning the new one it is sometimes necessary to see what the old ones looked like. The fire that struck the office formerly occupied by Barry Turner and myself (at approx. 3 a.m. on Wednesday, June 22, 1971) has consequences that are difficult to evaluate at present. At the outset I might mention that there are obviously a whole scale of losses that one can suffer during one's life, and losing the contents of one's filing cabinets, most of one's research data, correspondence, etc., does certainly not rank with more personal losses of family or friends. So it is easier to talk about it. That does not detract from the fact that a fire like the one that entirely destroyed our office was a disaster for us.

At 3:05 a.m. the fire department reached the NRAO having been summoned by a security officer on his regular patrol. The officer had spotted flames licking out of the end windows on the top floor. He called the fire department and cleared the building of inhabitants, i.e., the computer operator and a few others. The computer operator called Al Braun before leaving the building and Al told me that when he got to the NRAO building, very soon after the fire department, the office looked, from the outside, like a pot bellied stove looks when you open its door.

We know that the temperature inside the room reached an enormous value, the fire being fed by most of Barry Turner's computer output spread neatly on the floor and under tables. A glass ashtray has been recovered which had melted and spread to cover an area twice its original size. An empty, glass, peanut jar had also spread out over the table to take up an interesting deformed shape.

For some reason, which may have something to do with the start of the fire (my Sherlock Holmes opinion), the door to our room was closed. It isn't usually. This fact saved the building since the fire, despite its enormous heat, did not burn through the door. It did burst the windows and melt the window frames, and, believe it or not, buckle 8 foot long slabs of marble used as a vertical finish on the exterior of the windows.



Turner's Desk

The entire contents of every filing cabinet and drawer were burnt and only the innermost part of the papers filed tightly together were partially saved. Since my current files were in this state, I at least have some important correspondence and paper work left. The files not so burnt were soaked with water anyway.

Barry, on the other hand, seems to have filed his material in ring back folders and those are apparently ideal for fanning the flames. He lost all of those.

Lesson #1 is, if you want to make your files fireproof, pack the contents very tightly. Lesson #2 (for observers), do not accumulate unreduced data in large quantities, otherwise a fire might reduce it entirely!

Continued, next page--

To return to the story. At 4 a.m., Jim Finks called me at home. I stumbled through the dark in the general direction of the phone, losing my way twice. In my mind, when it started to function, I was phrasing my comments if the caller had said "wrong number"! But it was Jim Finks, and in my befuddled state I realized that it was unusual to be called by anyone, especially Jim, at 4 a.m. (We were once called by friends in California at 3 a.m., they thinking they were 3 hours ahead of us!) My wife heard me exclaim words like, "I don't believe it", "how awful", "how did it happen?". To her we clearly had a phone call from her (or my) family. She finally got up when she heard me tell the caller that Barry was in Tucson. I hung up and went back to bed and then it hit me, so I drove to the NRAO and found that Jim wasn't kidding about the damage caused. I found the building swarming with firemen, adrift in water and ash, and I pushed my way into our office. There I saw a couple of firemen systematically going through my filing cabinet drawers and pouring large quantities of water into them. Even after they all left, two piles of paper caught alight and needed dousing to stop the whole lot burning again.

Center of Room 310

At about 5:30 I phoned Barry and found him at the 36' telescope just in the process of going to the focus with an oscilloscope to see why the receiver wasn't working. Those of you who have had the experience of doing that sort of thing at 2:30 a.m. (his time) will know that one is not at one's best at that time of the day. To find his officemate on the other end of the line telling him that his office was destroyed didn't help at all. Barry's chief concern was a bookcase with his most important papers in it. I went to look for it and found it gone. The firemen had thrown it out of the window. It was outside with some of the paper still burning.

Now to consider a few "what ifs". What if the security guard had come around 30 minutes later? Unquestionably the office opposite ours would have been on fire. The flames had already blackened the ceiling there, after going through a ventilation shute over the corridor.

What if the security guard had come around one hour later? I think the door would have burnt down in another 15 minutes and the carpet in the corridor would have helped the fire to the rest of the top floor. What if the top floor had been destroyed?

What if the door had been open? The fire would almost certainly have spread to other rooms. What if the fire had started in any other room? Well, our office is bounded on one side by the outside wall, the other side by a stairwell, therefore, both main walls are concrete. All other rooms have non-concrete walls separating them. I'm sure many rooms would have been lost if the fire had started elsewhere.

Continued, next page--

What if the floor had not been covered by computer output? Well, who knows? Lesson #3. Throw out unwanted paper!

As far as my research work was concerned, the two most important manuscripts I was working on were in my briefcase, at home! Barry, on the other hand, lost all of his major OH survey results.

What was the cause of the fire? No one knows. The following suggestions have been aired:

1) Left or right wing extremists!

2) Air-conditioner or wall plug sparking.

3) Cigarette ends. No occupant of the room smokes, but perhaps the person(s) who closed the door did.

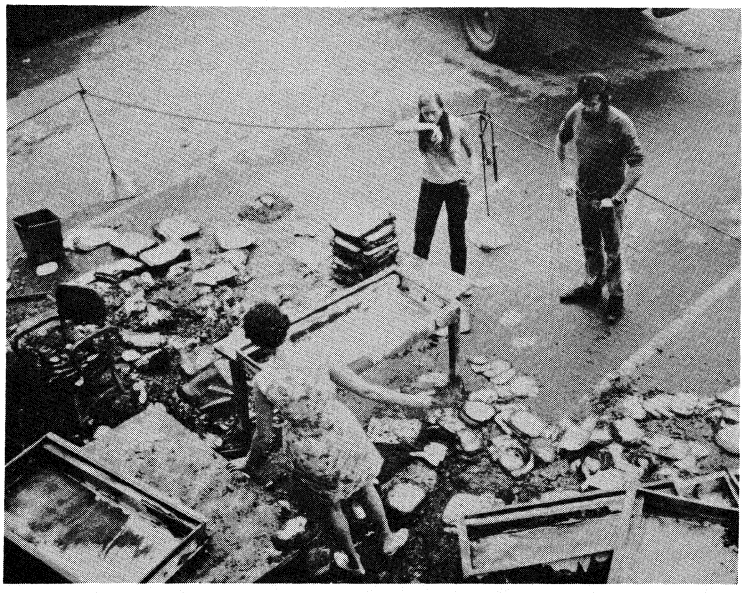
4) Jealous radio astronomers! (from where?)

The following coincidences have been noted. I recently sent a very strongly worded criticism of someone's paper to a journal in Europe, but they couldn't get here so soon!

The molecule search game is pretty hot, but is it so hot that Barry's possible detections need to be burnt? (On the other hand, Acetone is highly flammable, isn't it, Barry?)

On a more serious note, Barry's first reaction was that it set him back 3 years. I lost the results of at least 9 months work, most of it not of the greatest importance, and correspondence dating back 10 years, some of it of great historical value (to me). One can always ask, so what? One gets more observing time and collects new data and doesn't lose much headway. But there are important things like notes on one's research, as in Barry's case, concerning the calculation of new molecular transitions, etc. They can hardly be replaced in a short time.

Lesson #4: If some piece of data or work is so important, copy it and keep a copy at home.



B. Smith, G. Verschuur, and M. Turner looking over fire damage.

The advantages in losing one's office contents are few. It forces one to think anew about the research problems one was working on and it cleans out cobwebs and cupboards. This has an immediate disadvantage which we must still face, and that is when the room is rebuilt and we move in again it will seem quite empty. This might lead to someone getting the bright idea that the room is big enough for three people. To avoid this, we need to fill it up again, so if anyone wants to store his output in our room, let us know! It'll make the place feel more like home!

A final serious note. The contents of the offices are not insured, and a homeowner's policy does not usually cover personal belongings in one's place of business. As a result, our loss of text books, and other astronomical books is a total one and probably only allowable as a tax deduction. I advise those with large collections of their own books or journals to investigate the insurance they have for these.

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GREEN GROWS USA

Bob Samples
ES/ESTPP Newsletter
Boulder, Colorado

If you need a book to get your_____ (choose one) off your back, please read Charles Reich's The Greening of America.

a. principal
b. uptight teacher
c. dean
d. department head
e. (put your own here)

Reich is, in my opinion, so frantically on target that his major effect has been to alienate himself from many formerly amiable colleagues. His thesis is that the evolution of America as a nation has gone through a series of phases marked by changes in the fundamental ethic that structured the attitudes of the country. The first phase is a period dominated by the puritan ethic born of the persecuted Mayflower crowd that brought revolutionary resentment to the new world. Then came the revolution! Not the one against the British, but the one against the plow ... the Industrial Revolution! With it was born the ethic of efficiency .... technocracy. In its wake the Industrial Revolution left us with an admiration for systems, bureaucracies and administration. We inherited the notion they were both necessary and virtuous. Reich points up that the notion may not be so. He calls to the fore the third ethic... that of the individual. He brings the major perspectives of today's youth into focus. He questions the historical biases that we have accepted without question and invokes the emergence of honesty in dealing with intrinsic forces. He says the third consciousness state provides us with a glimpse of tomorrow.

Reich's biases are clear, and by the tone of this review you can see that I agree. Reviewers are supposed to be objective... so my conclusion is that I shouldn't be a reviewer. I liked, wanted and supported the words and feelings of Reich too much to become pompous enough to be objective. Rumor and journalists (Look, April 6, 1971) say Reich likes and is liked by his students. What more could one ask--to be admired by his students and suspected by his peers.

I hope you read the book.

****

NOTICE

The Green Bank Potters Guild (a non-organization which has no fixed membership, no officers, no budget, no Christmas party, and assembles pretty much at whim) is sponsoring an evening pottery workshop open to one and all at the Arbogast House on July 13 at 7:00.

For the most part, we'll be trying our luck with the potters wheel again. But anyone interested in exploring any aspect of the pottery process is welcome.

We aim to have a Clay Day for kids sometime in August.

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TOURISTS

The tourist season is in high gear. As of July 5, 1971, 4,520 people have taken the NRAO tour. For the same date last year, there were 3,735 visitors. The average number of visitors per day has been 196 people. The most popular tour day has been Wednesday and the least popular tour day has been Monday. The highest one day registration was 459 on June 30, 1971. So far 50 states have been represented and 5 foreign countries.

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TUMBLING TEMPERATURE

"Peck" McPherson noted on June 6, 1971, that the outside temperature at 1:50 p.m. was 86°. At 2:05 p.m. it had dropped to 58°. The 28° temperature drop was followed by driving rain, hail, and hard winds.

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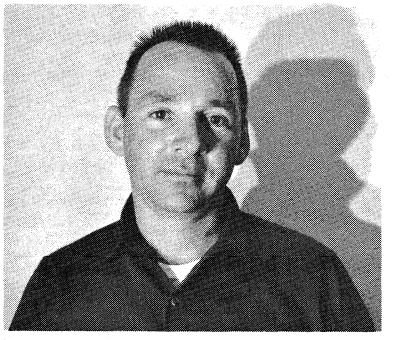
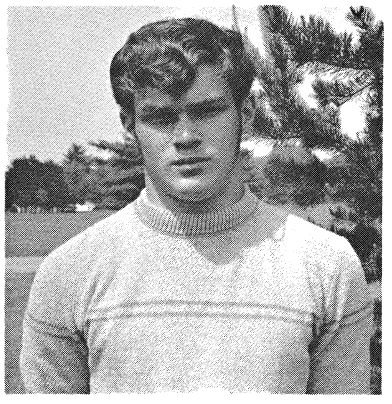
NEW EMPLOYEES

Paul A. Kesler
Bus Driver
Administrative Services

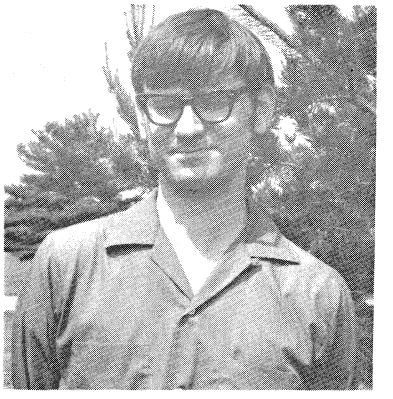


Gene H. Kesler
Bus Driver
Administrative Services

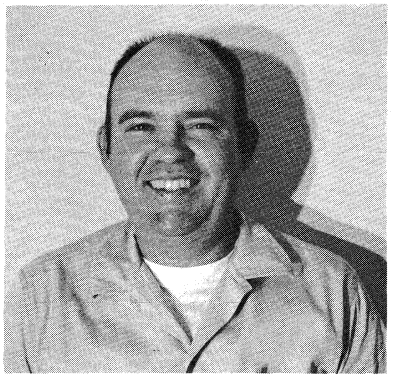


Gary C. Beverage
Laboratory Trainee
Electronics Div.

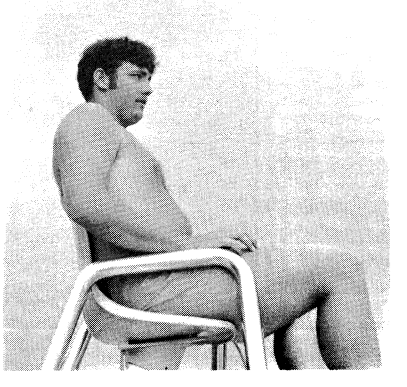
Jean P. Trainum
Secretary
Computer Division



Paul D. Hemenway
Jr. Research Associate
Scientific Services



Albert Z. Taylor
Bus Driver
Administrative Services



John D. McLaughlin
Life Guard
Administrative Services

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SUMMER/CO-OP STUDENTS

Seated (L-R) - Riccardo Giovanelli, B. Smith, Linda Lucignani, Robert Boyle

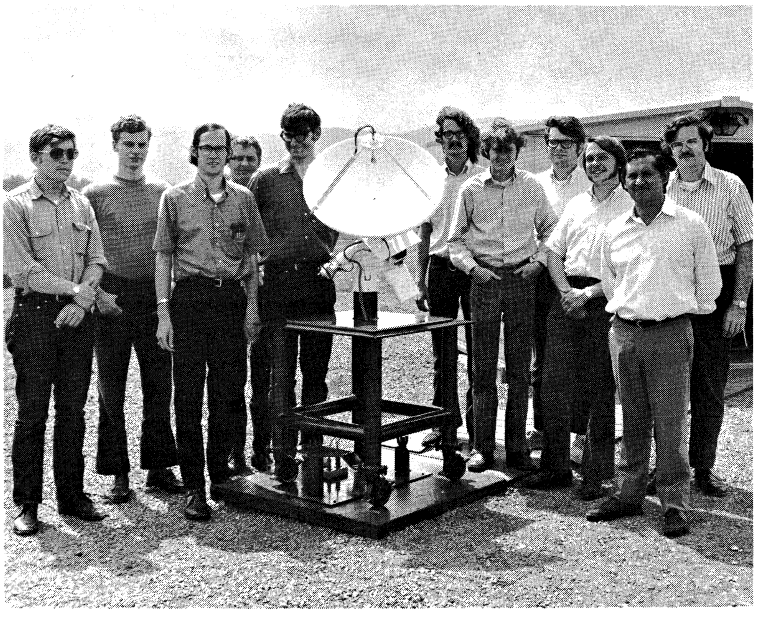
2nd Row - David Koo, Patrick Yeung, William Fawley, Haywood Smith, Mark Zabek

3rd Row - David Burke, Charles Lada, Paul Giguere, Robert McMillan, James Fullmer

Not present when photo taken - Keith Sword, James Jafolla, Louis Gross, Allan Spradling, Trinh Thuan

SUMMER STUDENTS

From Left to Right - Robert Mutel, Staffan Olson, Dennis Sweeney, Robert Houck, Paul Hemenway (not student), Nelson Hoffman, Kenneth Cantrell, Brian Dennison, Peter Camana, Santiago Tapia-Perez, Mark Hartoog



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REHIRES

Lewis C. Snyder, Engineering Division
Michael L. Anderson, Administrative Services
Shirell A. Farris, Computer Division
C. Keith Sword, Scientific Services
Claudia L. Peery, Administrative Services
Susan M. Gillespie, Administrative Services
James W. Fullmer, Scientific Services
Douglas G. Morrison, Administrative Services
Charles E. Rexrode, Maintenance Division
James C. Jafolla, Scientific Services
Louis J. Gross, Scientific Services
Dr. Thuppalay K. Menon, Basic Research
Dr. Carl E. Heiles, Basic Research

****

TERMINATIONS

Gary A. Bonebrake, Electronics Division
Tilden W. Gladwell, Telescope Operations
Roy H. Sharp, Telescope Operations
Sue A. Winkler, Computer Division
James R. Forman, Central Shops
Alan D. Ezer, Scientific Services
Stephen J. Hirsch, Scientific Services
Sol Lawand, Scientific Services
Charles E. Rexrode, Maintenance Division
Ralph D. Waybright, Maintenance Division

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MR. O'LEARY

Mr. O'leary was, far and away, the town's most popular septuagenarian. Friendly of disposition, he was also a man of quick and sometimes scathing wit. One of his most favored diversions was a visit to the local tavern. It is told of how he would spend long hours there inbibing ale and lecturing eloquently on politics and religion. As an excuse for making these outings, he would often tell his wife that he was going to the post office.

One evening after an especially rousing day at the "post office", Mr. O'leary, with unsteady gait, came hurrying homeward. Mrs. Jones, the town busy-body and gossip, saw him staggering by and, leaning disdainfully over her fence, she loudly exclaimed, "Mr. O'leary, you're undoubtedly the drunkest man I've ever seen!"

Mr. O'leary stopped, and gently weaving as he gave her an amused up and down look, emphatically retorted, "Mrs. Jones, you're undoubtedly the ugliest woman I've ever seen--and I'll be sober tomorrow."

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BOWLING NEWS

Bob Eskanazy

A bowling banquet held the evening of June 22, 1971, at the Library Restaurant, officially brought to an end the 1971 bowling season for NRAO Charlottesville. The hugh success of the party was largely due to the efforts and contributions of the League Prize and Banquet Committee. The committee consisted of Hein Hvatum, Phyllis Jackson, Mary Ann Starr, Jackie Cochran, and our beloved presiding president, Arthur M. Shalloway. Mr. Shalloway also proved to be quite a host at the presentation of awards by playing Master of Ceremonies. His wit and display of humor set the mood which was to carry throughout the entire evening.

The dinner consisted of a 6-oz. filet mignon, vegetables, salad and dessert. All of which, I might add, was very good. Mood music on a piano, a nice extra provided by the restaurant, helped to enhance the mood of the evening.

Congratulations to all our award winners for the fine job they did during the current year and many thanks to all the participating bowlers. Here's hoping that seasons to come will be just as fun-filled as they have been in the past. In passing out the credits, I would also like to thank the Recreation Association, NRAORA, whose funds helped so much in making the promotion of interest in the sport a success.

The standings at the close of the season and the awards for achievements are outlined on the following page:

Continued, next page--

Final Team Standings (Trophies and ABC Patches) for 1st Place Team

1st Place	Resistors	Bob Eskanazy, Captain
2nd Place	The Four G's	Phyllis Jackson, Captain
3rd Place	Buffers	Elain Litman, Captain
4th Place	N.A.T.S.	Louise Ashworth, Captain
5th Place	Team Too!	Jesse Davis, Captain
6th Place	Narrows	Shelton Reid, Captain

Team High Series (Trophies) Trophy was combined with 1st place trophy reflected on engraved plate.

Resistors	2258	Bob Eskanazy, Captain Gloria Eskanazy Jackie Cochran Gene Runion

Team High Game (Trophies)

Team Too!	827	Neil Albaugh, Captain Jesse Davis Wolfgang Wiedenhoever Hannalowe Wiedenhoever

Individual High Average - Male (Trophy)

Eugene Tademaru	169

Individual High Game - Male (Trophies)

Hein Hvatum	222
Bob Eskanazy	222

Individual High Series - Male (Trophy)

Jackie Cochran	581

Individual High Series - Female (No Trophy - at request of recipient. WIBC pin was awarded)

Louise Ashworth	543

Individual High Game - Female (No Trophy - at request of recipient)

Mary Ann Starr	197

Most Improved Bowler (Plaque)

Elain Litman	From 112 to 122	(10 points)
Jesse Davis	From 108 to 120	(12 points)

Award for Triple Score

Karen Brown	3 games of 79 each	(WIBC Patch)

140-FOOT

Bob Nichols

Yes, we are still here, perhaps suffering a few physiological problems, but we are here. I have decided that the next benefit we should push for is a head-shrinker in residence. I know, after eight hours of KIK's 30 seconds on/offs, I need help.

Anyway, to the news. We are in the process of bringing in a new console and out with the old console. The new one is one of these bigger and better things we all hope for. Dave Van-Horn has been doing most of the work on the console, so this is just a relay of information.

The entire console will consist of three vertical racks, - six double, sloping control racks, two 45 degree, pie sections, and a matching cart. Readouts will be provided with two Infoton CRT computer terminals. There will be one for telescope position and one for data. The console will be built by Electronic Enclosures, of Pennsauken, New Jersey. The console is now on order, and we hope to have it in operation by 31 December 1971.

Present plans also call for the replacement of our pilot drive system and thus end one headache for the 140-foot crew and Marvin Wimer. We plan to simply switch the headache to the Computer Division, though, by replacing the pilot drive with a DDP 316 computer. Our goal, of course, is to achieve full computer operation.

Those recent rumors that the 140-foot was falling apart are not true. Only the surface of the dish was falling off. One of the electronic engineers suggested we secure it with #88 black tape, but, I think, the mechanics finally decided it would be best to use rivets.

I wish to announce that this article was written under severe threat of force. Jon Spargo caught me mowing my yard with my Gravely and said if I didn't write an article he was going to let the air out of the tires on my sulky. I hope all this air will save my air for at least a couple of months.

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GREEN BANK RIFLE & PISTOL CLUB NEWSLETTER

George C. Liptak, Pres.

Each year the Green Bank Rifle & Pistol Club sponsors a boy and girl to attend the Youth Conservation Camp at Camp Ceasar, near Webster Springs, Webster County. This program is held yearly during the month of June and is conducted by the Conservation Department of the Department of Natural Resources and state chapters of organizations devoted to land, water, game, fish, and water fowl conservation.

This year, the names of all students, dependents of Green Bank NRAO employees, ages 15-19 years, numbered seventeen boys and twenty-three girls. Names were compiled and the drawing was made by Club members not having eligible youngsters. One winner and one alternate of each sex were random drawn.

Those so drawn were Steven Viers and Charlotte Beverage, first place winners, and Rusty Taylor and Susan Crews, first alternates. However, due to summer job commitments and planned vacations, Steven, Rusty, and Charlotte could not attend. Susan Crews and a second male alternate, Christopher Staud, accepted to attend.

The Rifle & Pistol Club is proud and very happy to sponsor these young students to a week of work and play, with subject matter that should concern more of us more often, young and old alike --- CONSERVATION.

We wish those students a pleasant and informative week!

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We are very happy to announce the procurement of material for new and complete target holders for the rifle range. This material will give targets at 50', 50 yds., 100 yds., and 200 yds. It is hoped that in the near future other improvements will be added. Our thanks to Dr. Hogg and the Recreation Association Board of Directors.

Members: Please note that we will be holding two matches each month this summer if possible. Watch the bulletin boards for further notices.

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300-FOOT TELESCOPE

Ken Cottrell

It is with sad regret that we note the parting of operators Tilden Gladwell and Roy Sharp. Their winning personalities, and their skill in workmanship will be sorely missed and long remembered. We wish them health, happiness, and success in all their future undertakings. T. J. and Roy, "Ya'll come to see us now and then."

Filling in for T. J. and Roy are two old hands at 300-foot operations, George Liptak and Al Hogan. George returns from the Interferometer and Al has been serving at the 140-foot for nearly the past year now. Both are valuable operators and esteemed persons, and we join, heartily, in welcoming them back.

A new wing is being added to the control building. Surveying and excavation work have already been accomplished at this writing. It is expected that the new addition will be completed sometime in August of this year. We have long been in need of more equipment space at the 300-foot. Very often the present, small control building has been crowded to the point of exasperation. It has been so jam-packed with equipment that there was precious little room for personnel to move about and perform their work.

The traveling feed, the new surface, and now the Sterling mount are improvements which have made the 300-foot, meridian transit telescope, very possibly, the finest (for sure, the most versatile) instrument of its type in the world.

The latest improvement, the Sterling mount, does for high frequency observing what the traveling feed does for low frequency observing. And it does even more. While, like the traveling feed, making it possible to track radio sources in limited right ascension, the Sterling mount also permits focus adjustments over a broad range, and for rotation of the feed to any desired polarization setting.

The conception, planning, design, construction, installation, and operation of this remarkable piece of equipment bears signal testimony to the evident NRAO can-do spirit. The fact that the Sterling mount was operational, without need for the slightest "de-bugging", immediately after being installed can be attributed to no less than engineering excellence of the Nth magnitude.

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GREENVALE KINDERGARTEN

Dorsalene Henderson

The board of Greenvale, Inc. had a business meeting June 2, 1971. In addition to the board members (George Liptak, Perryn Fleming, Elizabeth del Giudice, Mike Davis, Harry Fox and Bill Shank), Taylor Cremeans, Superintendent of Pocahontas County Schools, Charles Young, Green Bank Elementary School Principal, Dorsalene Henderson, Greenvale Kindergarten teacher, and Jo Ann Gardner, Greenvale Kindergarten aide, were present. The meeting was held concerning next year's kindergarten age child.

Mr. Cremeans informed the board that the Pocahontas County Board of Education will open public kindergarten for the school year 1971-72. Three kindergarten centers will be made ready according to Mr. Cremeans. One in Green Bank, one in Marlinton, and the other in Hillsboro. Durbin would have access to the one at Green Bank, according to present plans. There will be two sessions--one in the morning and one in the afternoon. Each session will have twenty students, one teacher and one aide.

Greenvale voted that all equipment of Greenvale Gindergarten would go to the public kindergarten.

Our county kindergarten program will open August 27, 1971. Registration will be announced by Mr. Cremeans in the county papers.

As your Greenvale Kindergarten teacher, I wish to say I have enjoyed all the time we have worked together for the benefit of your children, and I am now looking forward to the idea of this experience being made available to far more children in our county.

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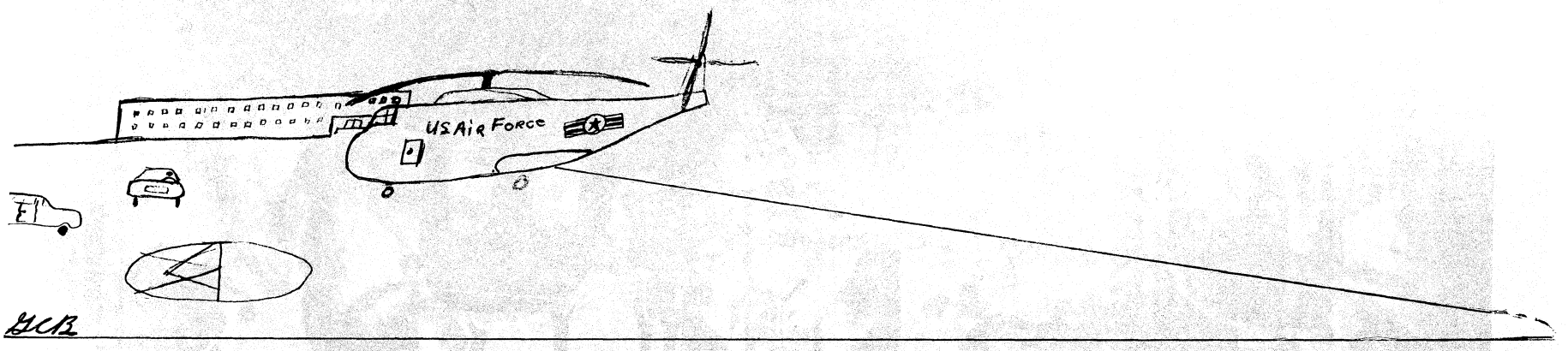
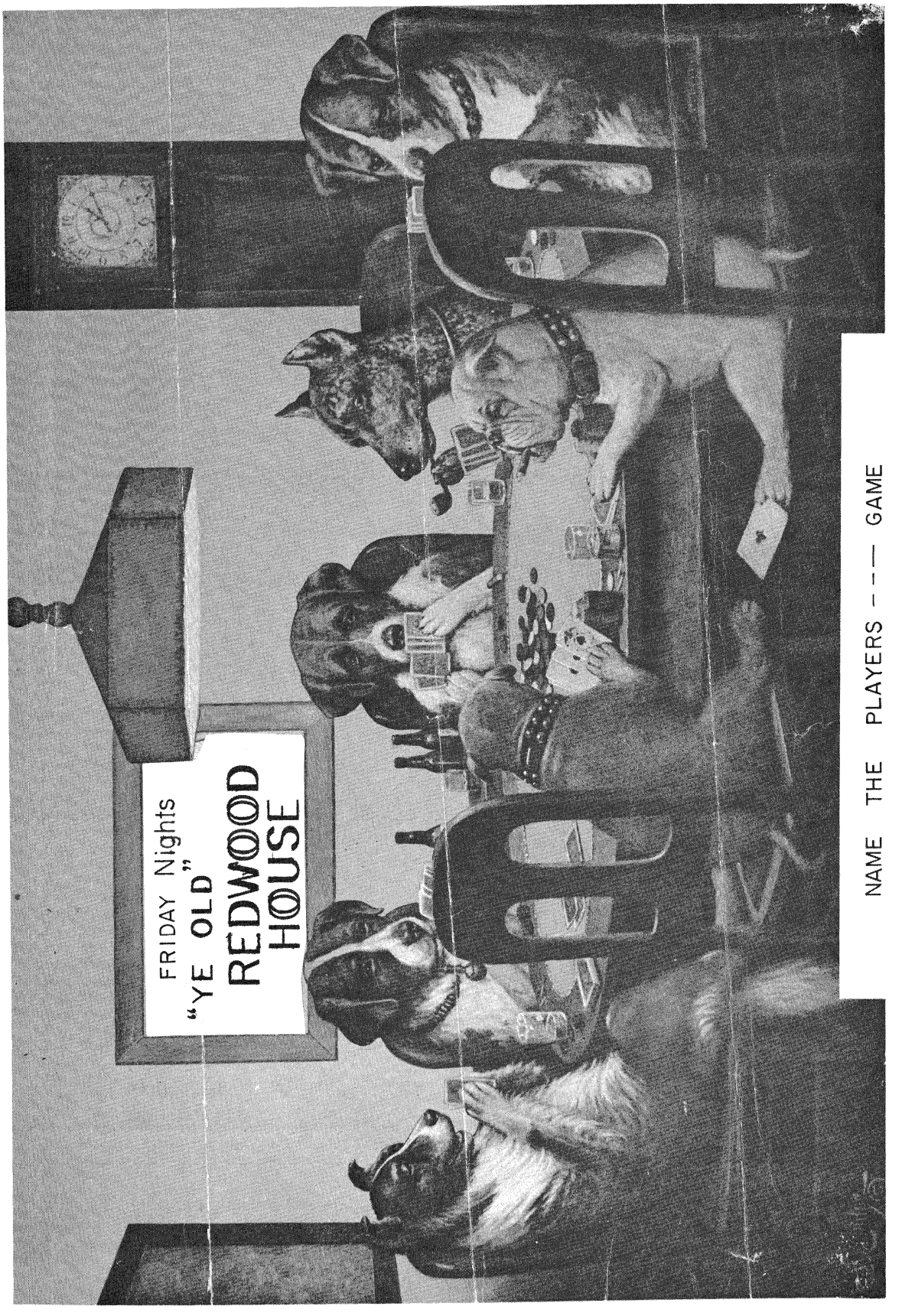


I've heard of keeping the Dandelion Fuzz off the parking lot, but this is Ridiculous!



NAME THE PLAYERS --- GAME